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THE FAMINE IN MADRAS AND BOMBAY.

THE great famine of 1873-74 in Bengal has been followed, with alarming rapidity, by the present scarcity extending over a large area of the Madras and Bombay Presidencies. The duty of relieving the distress thus caused, and of sanctioning large expenditure, in order to prevent loss of life, has been fully accepted by the Government of India; and the provision for this expenditure has consequently become an administrative question of paramount importance. Under these circumstances the duties of organising an efficient means of obtaining accurate agricultural statistics, and of practically applying the deductions of meteorological science must henceforth take a foremost place. For complete knowledge on these points will furnish the administrator with the means of anticipating scarcity, of estimating the cost of providing against it, and of adapting his measures to the exigencies of each case as it arises. On former occasions the inability to avert frightful mortality in one instance, and the enormous expenditure in another, were both due to want of knowledge.

In our number for February, 1874 (p. 441) we gave some account of the principal features of the Bengal famine; and in that for March, 1875 (p. 73), Mr. H. P. Malet, who had himself administered the district of Sholapore during a time of famine, gave some further details, and pointed out the immense importance of a season of scarcity being anticipated, and of there being sufficient warning to give time for the necessary measures for meeting it. Mr. Malet described to us the policy he adopted in Sholapore, at the time of the great famine in 1833-34. The failure of rain means a failure of food, and this ought to be known in the previous August. The Banyans were then consulted as to their stock in hand, and were informed that the Government intended to give occupation to unemployed labour. Estimates were made of the probable demand for grain, and the Banyans were asked if they could meet it at their own price, the Government undertaking to pay their bills. In Sholapore, in 1833, they undertook this duty; they imported during the season sufficient food for all demands, and secured to themselves the profits of their arrangement. The relief works were carefully organised, and under these arrangements the Sholapore district met an extensive famine with success.

The essential points, in famine administration, are an early warning of the approach of a year of scarcity, exact knowledge as to the quantity of grain existing in the various districts, a famine code as regards the best system of relief works, and a complete understanding between the Banyans and the Government, so that the extra demand for grain may be met by the operations of private trade.

The admirable revenue settlement and survey of Bombay, which includes a complete system of recording agricultural statistics, and the well organised village communities, have enabled the government of that presidency to keep the famine well in hand. We may compare the state of affairs in the beginning of the present century, and the arrangements in force to meet the present scarcity, with feelings of pride and satisfaction at the results of half a century of English administration. In 1803 there could be no meteorological forecast, because famines were as often caused by the devastation of Mahratta chiefs as by the failure of rains, and frequently by a combination of both forms of calamity. The readers of Lord Valentia's travels* will remember how, in October, 1804, the roads of the Deccan were strewn with dead bodies, and the people were perishing by hundreds. Yet even then, though the Peishwa was still ruling at Poona, the British Government at Bombay fed 12,000 people from stores of rice procured from Bengal. Now a complete system of relief works is organised, the supply of grain fully meets the demand, and the officials of the Bombay Presidency have got the famine well in hand.

In 1876 the north-east monsoon failed over a great portion of the Madras Presidency, and this was followed by a failure of the south-west monsoon which rendered a great scarcity inevitable over a vast area both in Madras and Bombay. In December it was calculated that 80,000 square miles, with a population of 18,000,000, would be affected in the Madras districts of Cuddapah, Bellary, Karnúl, Madura, Chingleput, the Arcots, Salem, Kistna, and Coimbatore; and 54,000 square miles, with a population of 8,000,000, in the Bombay districts of Khandesh, Nasik, Ahmednagar, Sholapur, Satara, Kaladgi, Belgaum, and Dharwar; and the cost to the State of relieving the necessities of the sufferers was calculated at 4,380,000*l.* There were, in December, 840,000 people on the relief works in Madras, and 250,000 in Bombay; and it was anticipated that the distress would increase in intensity until April, and then gradually diminish, ceasing in September. The scarcity of fodder for cattle, without which the land

*II. p. 108.

cannot be cultivated, is nearly as great a calamity as the failure of the food crops; and, as early as November, it was conceded, in the Bombay Presidency, that forest reserves might be made free grazing grounds in the distressed districts.

One of the most important points connected with famine administration is the organisation of relief works. The main objects must be that they should be as economically managed as possible, and that they should be thoroughly under official control in all the details of their management. Hence, although when scarcity is confined to one district, the relief works may properly consist of small undertakings, such as local roads and the repairing of tanks near the homes of the sufferers, it is necessary to organise works on an extensive scale, and to concentrate large bodies of recipients of relief, as soon as the famine spreads over a large area, in order to secure efficient control.

The lessons of the present famine will be that the systems of recording agricultural statistics must be put on a thoroughly efficient footing throughout India, that a famine code must be prepared, so that local officials will clearly understand the principles on which administration in times of scarcity should be based, and that close attention must be paid to the teachings of meteorology.

In the course of his recent tour of inspection, Dr. Hunter had occasion to study the coincidences of famine years in the Madras Presidency with minimum sun-spots, and he has drawn up a very interesting memorandum giving the results of his investigations.

In 1865 Chacornac and Lockyer discovered that the spots are produced by a down-rush of the cooled external atmosphere of the sun.

In 1872, at the meeting of the British Association at Brighton, Mr. Meldrum, of Mauritius, brought to notice the fact that the cyclones of the Indian Ocean vary in frequency with the periods of sun-spot frequency; and since that time several attempts have been made to trace out the evidence of a similar periodicity in other meteorological phenomena. Mr. Meldrum and Mr. Norman Lockyer have done so in the case of the rainfall of Mauritius, Australia, and South Africa; and Professor Koppen has arrived at a similar conclusion in the case of air temperature. In 1867, Mr. Joseph Baxendell, of Manchester, traced out a distinct and very striking relation between the number of sun-spots, and the ratio that exists between the difference of the mean maximum temperature of solar radiation and the mean maximum temperature on the one hand, and that of the mean temperature of the air and of evaporation on the other. The whole subject has recently been discussed, in a very interesting paper, by Mr. H. F. Blanford, the Meteorologist to the Government of India.* His conclusion is that the sun's heat varies from year to year to such an extent as must appreciably affect terrestrial phenomena. His observations with a maximum thermometer, the bulb of which was coated with lamp black, and which was enclosed in an exhausted tube, were commenced in 1867; and the results agree in showing a very decided variation of the incident solar heat. He concludes that if the sun's radiation varies with the number of spots and prominences, every other meteorological phenomenon must likewise so vary, rainfall and temperature included; and there are, therefore, *a priori* grounds for the validity of the discoveries of Meldrum, Norman Lockyer, and Koppen.

Mr. Blanford thus concludes his paper: "It is needless to point out that a vast train of enquiry is opened up by the fact, once established, that the solar heat undergoes a periodical variation. It is, I believe, of high importance to meteorology, or will be so when the amount of variation shall have been ascertained in terms of absolute measurement, and it affords a strong additional incentive to the establishment of an observatory in India, such as has already been founded under the less favoured skies of Germany and the Rocky Mountains, for observing and measuring the variations of the sun. These, and their immediate effects are, by prerogative, the study of the tropics." It is to be hoped, therefore, that regular actinometric observations may soon be undertaken at the new solar observatory under Colonel Tennant, at Simla.

Mr. Pogson, the astronomer at Madras, holds that the periods of minimum sun-spots are the periods of maximum heat; and he estimates the direct solar heat of the tropics at several degrees higher during the period of minimum maculation than during the opposite period when the sun-spots most prevail. In arid tracts excess of heat prevents vapour from condensing into rain-clouds, and the usual rain-supply would then be carried over such tracts in a gaseous state, by the prevailing winds, until meeting cooler currents.

Struck with this theory, Dr. Hunter made a close study of the Madras rainfall with reference to sun-spots, and arrived at certain provisional conclusions. There is a record of the rainfall at Madras extending over sixty-four years, from 1813 to 1876, and the average yearly fall is 48·51 inches. On a close examination Dr. Hunter found nothing like a *uniform* increase or decrease of rainfall in proportion to the increase or decrease of sun-spots. The sun-spots run through cycles of increment and decrease varying from nine to fourteen years, taking only three or four years to rise from the minimum to the maximum, and seven or eight to descend again to the minimum; and Dr. Hunter found that the minimum period in the cycle of sun-spots was a period of regularly recurring and strongly-marked drought in Southern India. Thus there is a cyclic coincidence between the rainfall and the sun-spots.

The years of famine in Madras were 1811, 1824, 1833, 1854, 1866, and 1877, there being deficient rainfall in the preceding years. The years 1810 and 1823 were years of minimum sun-spots, 1832 was a year preceding minimum sun-spots, 1853 was the third, and 1865 and 1876 were the second years preceding minimum sun-spots. In all these years the rainfall was far below the average of 48·51 inches, and it has been found that 20 inches below the average produces a famine.

The general conclusions arrived at by Dr. Hunter are that there is no uniform relation between sun-spots and rainfall, but that the minimum sun-spots coincide with years of drought. The droughts recur in cycles of eleven years, on the second and eleventh years, which series contain six out of seven years of minimum

* "On some recent Evidence of the Variation of the Sun's Heat," read June 2nd, 1875. *J. A. S. B.* xlv., Part II. (1875).

sun-spots. Dr. Hunter carefully guards himself from being supposed to offer any theory, and his conclusions only apply to Southern India. The materials are too scanty to permit of inferences, and he merely records the indications to which they point.*

We have drawn special attention to Mr. Blanford's paper and to the interesting investigation into the Madras rainfall by Dr. Hunter, because they show the great importance of meteorology in Indian administration, and the close connection and alliance that should exist between scientific work and practical statesmanship. If there is, in future, to be ample warning of an approaching famine, and if the scarcity caused by failure of crops is to be kept well in hand when it does come, there must be a more thorough and systematic record of agricultural statistics throughout India, and a due appreciation of the importance of meteorology.

THE HIMÁLAYAN SYSTEM.

(A reply to an Article in the "Calcutta Review" of January, 1877.)

THE structure of the great Himálayan mass, bounding India on the north, is a subject to which many travellers and systematic geographers have devoted a large share of their attention. The difference in the views that have been enunciated arise, not so much from any divergence as regards physical facts, as from a misunderstanding of definitions, and, in some cases, from failure to comprehend the subject in all its bearings. A writer in the *Calcutta Review* of January 1877, in criticising my Introduction to the *Narrative of the Mission of George Bogle to Tibet*, has put forward a view of the question which combines two faults, namely, erroneous nomenclature, and a misconception of the physical geography of the region of which he treats. But, as this is the latest attempt to discuss a very important geographical question, I propose, in noticing it, to take the opportunity of offering some account of the various systems that have been formulated. It will be seen that, in reality, it is a mere question of definitions, arising, in a great measure, from a failure to understand the subject—in other words, from a want of geographical insight.

As regards the earlier attempts at generalization, I cannot do better than repeat, in fewer words, the account I gave in the *Memoir on Indian Surveys* (p. 247). I there said that the reports of a long series of travellers necessarily preceded the first effort at generalization, and that Captain Herbert was the first geographer who attempted to give a general view of the physical character of the Himálaya.

Writing in 1818, Captain Herbert's information was necessarily limited, but he had before him the narratives of several Himálayan travellers, and he had a personal knowledge of the western part of the range, from the Kali to the Sutlej. He was the first to point out that the line of water-parting was not always synonymous with that of greatest elevation. In exploring the Western Himálaya he could distinguish no continuous chain of elevation on a cursory glance. There seemed to be nothing to lend a clue to the development of the mountain masses, and there appeared only an assemblage of elevated peaks confusedly heaped together. But he soon perceived that by tracing the courses of the rivers and tributary streams, a clue would be found to lead an observer out of this labyrinth. As regards the part of the Himálaya from the Sutlej to the Kali, instead of a succession of parallel ranges rising one behind another in regular array, he made out a continuous chain forming an irregular curved line, with the Sutlej bounding it to the north and bending round its convex side, while the sources of the Ganges rise within its concavity. He called this the Indo-Gangetic chain, and his description of it is precise and accurate. His next chain is that separating the sources of the Jumna and Ganges. He adds that the ramifications of ridges would almost bid defiance to any analysis, but for the assistance derived from observing the courses of the rivers. He observed that the ridge separating the Ganges and Indus basins was not the highest ground, and that the most elevated peaks were on a series of transverse ridges which seem to ramify from the Indo-Gangetic chain, over which they tower several thousand feet. He traced a connected line of peaks, not under 21,000 feet in height, and intersecting the water-courses, and concluded that they did not form a range of mountains because rivers broke through them. This erroneous notion of the essential character of a range of mountains explains his misconception of the Himálayan system. A *cordillera*, or range of mountains, is a ridge of elevated land running in one general direction, and the fact of its being cut through by one or more rivers does not alter its character and convert it into a series of spurs or ramifications. It still remains a range of mountains, and any other conception of it would give a most erroneous idea of its physical character. The theory that when a chain of mountains is cut through by rivers it becomes a series of spurs was thus originated by Captain Herbert, and may be called the Herbert theory. It was adopted by Dr. Thomson, Mr. Brian Hodgson, and Dr. Hooker.

Dr. Thomson was the first traveller, after the Chinese pilgrim Fa-Hian, who reached the summit of the Karakorum Pass, and he has discussed the physical structure of the Western Himálaya with great ability. Following Herbert, he considers that the only feasible mode of division is afforded by the courses of the different rivers. If these be taken as guides, he holds that the mountains will be found to resolve themselves into two great systems; and he gives Herbert the credit of having first pointed out the impropriety of regarding the Himálayas as a single chain running parallel with the plain. He proposes to call Herbert's Indo-Gangetic the Cis-Sutlej, and the chain commencing at Kailas the Trans-Sutlej Range.

Mr. Brian Hodgson, during a long residence in Nepal, thought much over the configuration of the mountains towering above the Valley of Kathmandu. In his paper on the Physical Geography of the Himálaya, he describes the Nepal division of the system as consisting of three river basins, those of the Karnali, Gandak, and Kosi, separated by peaked ridges parallel to each other, and at right angels with the main chain. Dr. Hooker adopted the same view.

* *The Cycle of Drought and Famine in Southern India*, by W. W. Hunter, LL.D., Director-General of Statistics to the Government of India. (Calcutta, February, 1877).

He described the great Himálayan mountain mass as a prodigious chain traversing Asia from east to west, and south of it flow the Indus and Brahmaputra, in different directions, rising nearly together. The chain between these rivers and the plains of India is the Himálaya. The axis of the main Himálaya lies far back and nearer to the two great rivers than to the plains; while, from the central axis, successions of secondary ranges descend on either side. These secondary ranges vary in direction, some being almost perpendicular to the main range, and others forming a very acute angle with it. Dr. Hooker thus considers the system as consisting of a main range, with numerous secondary chains branching from it, but all connected with the central axis, and not forming distinct mountain ranges. He says that Herbert's proposition of the line of great peaks intersecting the river basins and not forming the true axis, was the first enunciation of a very important fact in physical geography. "In Sikkim," he says elsewhere, "the Himálayas consist of meridional ridges separated by water flowing southward. They are not a continuous snowy range." The same view is repeated by Mr. Heeley in his article on Tibet in the *Calcutta Review* of July 1874 (p. 139).

This is the Herbert theory. The range rising from the plains of India has a continuous line of the loftiest peaks in the world, generally connected by ridges, and is in all respects a mountain chain—the southern range of the Himálayan system. But because the ridges are, in certain places, cut through by rivers rising in the central range of the system, this theory would convert a well-defined mountain chain or *cordillera* into a series of spurs from the central range. The misconception evidently arose from a too literal interpretation of the word "chain," which it was supposed could not continue if any of the links were broken. But a broad view of the subject will make it clear that a chain, even when partly cut by rifts, is still a chain, and is distinct in its origin and its character from a mere spur or ramification. The long series of peaks of enormous height continuing in one line for hundreds of miles along the southern Himálayan Range, establish it as a distinct cordillera or rope (rather than chain), though some of its strands are worn by the action of water.

Dr. Forbes Royle discussed Himálayan geography in his great work illustrating the botany of the mountains; and General Cunningham, in his work on Ladak, gives a general view of the physical features of the Western Himálaya, from the bend of the Bias to the Indus. He holds that the most striking characteristic of the system is the parallelism of the mountain ridges which stretch through the country from S.E. to N.W. He divides the mountain system into six distinct ranges: first, the Karakorum Range, from the sources of the Gilgit to that of the Shayok; second, the Kailas, or Gangri Range, from the source of the Indus to its junction with the Shayok; third, the Trans-Himálayan Range; fourth, the Great Himálaya; fifth, the Mid-Himálaya, or Pir Panjal; and sixth, the Outer-Himálaya. The Mid-Himálaya and Great-Himálaya of Cunningham would be the Cis-Sutlej and Trans-Sutlej ranges of Thomson; and the former would be the Indo-Gangetic range of Herbert.

Henry Strachey, in his general sketch of Western Himálayan geography, adopts the native Tibetan nomenclature. He considers the general plan of the mountain system to be a series of parallel ranges running in an oblique line to the general extension of the whole; the great peaks being generally on terminal butt ends of the primary ranges. The chief watersheds are often found to follow the lowest of the ridges, and the channels of drainage to cross the highest; deep fissures intersecting the mountains, often directly transverse to the main lines of elevation.

A more recent systematic attempt to give a general idea of the physical structure of the Himálayan region will be found in the sketch map and memoir prepared by Mr. Trelawney Saunders. He considers the Himálayan region to be included between the plains of India and the upper courses of the Sanpu, Sutlej, and Indus, and to extend from the gorge of the Indus to that of the Brahmaputra, a distance of 1400 miles. According to Mr. Saunders the system, within these limits, culminates in two parallel ranges running through the entire length, which he calls the Northern and Southern Himálayas respectively. According to the Herbert theory, the Southern Himálaya does not exist. Nearly all the great snowy peaks are in the Southern Range; but it is the Northern Range which forms the water-parting between the Ganges basin and the Sanpu. A series of valleys separates the two ranges, and through them flow the upper courses of the Jhelum, Chenab, Spiti, Basa, Ganges, and numerous affluents of the Ganges and Brahmaputra in the direction of the Himálayan axis, until they break through the Southern Range to join the main streams in the plains of India. The Indus, Sutlej, and Sanpu form a continuous trough in the same axial direction, and divide the Northern Himálaya from the Karakorum and Gang-dis-ri Mountains. The Karakorum divides the Indus basin from the basin of Lake Lob, and the Gang-dis-ri separates the Indus, Sutlej, and Sanpu from the elevated plateau of Tibet, which is drained by inland lakes. This general view is clear and perspicuous, and is made more so by the excellent map which accompanies Mr. Saunders's memoir.

I now come to the view of this question given in my Introduction to the *Narrative of the Mission of George Bogle to Tibet*, which has been the object of a laboured attack in the *Calcutta Review* for January 1877. My intention was to give a systematic idea of the great mountain mass which intervenes between the plateau of Tibet and the plains of India, including the Karakorum and Gang-dis-ri Range, which is not included in the Himálayan system by Mr. Saunders. I, therefore, treated of three main ranges, considering the Karakorum and Gang-dis-ri as the Northern; Mr. Saunders's Northern Range as the Central Himálaya; and the other the Southern. I described these as three great culminating chains, running more or less parallel to each other. The Northern Range is divided into a western and an eastern section. The western is known as the Karákorum Range, separating the valley of the Indus from the basin of Lake Lob. The sources of three great rivers are on the southern slopes of the Northern Range, and force their way through the Central and Southern Ranges, namely, the Indus, Sutlej, and Brahmaputra. The eastern section of the Northern Range separates the inland system of lakes on the Tibetan plateau from the valley of the Sanpu or Brahmaputra. It is sometimes known as

the Nyenchhen-tang-la mountains, and Mr. Saunders proposes that it should be called the Gang-dis-ri Range. Parallel to the Northern Range runs the Central Range of the Himálaya, the two enclosing the upper basins of the Indus, Sutlej, and Brahmaputra. On its southern slopes are the sources of many rivers which force their way through the Southern Range of the Himálaya, and eventually reach the plains of India. The Southern Range consists of a stupendous chain of snow-clad mountains, with a line of culminating peaks, and with slopes deeply furrowed into alternate ravines and ridges, the distance between the culminating ridge and the plain averaging about 90 miles; and this range is cut through by several rivers which rise in the Central Range beyond.

In noticing the Herbert theory, according to which the Southern Range is not a *cordillera*, because it is broken by the defiles through which the rivers force their way, which rise in the Central Range, I pointed out that this is not a question of fact, but of correct definition. If a cordillera is a range of mountains through which rivers force their way, as well as one which has an unbroken water-parting, then the Southern Range of the Himálaya is undoubtedly a cordillera or chain of mountains.

The Calcutta Reviewer fancies that he settles the question by saying that a row of unconnected links does not constitute a chain, and that the essence of a chain is the continuous connection of its links; and he goes on to assert that chains and cordilleras are not synonymous terms, and that cordilleras are bifurcations. They are nothing of the kind. The following definition of a cordillera, from the dictionary of the Royal Academy of Spain, is decisive on this point: *Cordillera —la continuacion de algunos cerros que, por alguna distancia, se siguen unos à otros en derechura.* A cordillera, then, is a range, or ranges of hills, continuing one after another in a direct line, whether broken through by ravines or not. The continuous line of lofty peaks with connecting ridges constitutes the Southern Range of the Himálaya a true cordillera. According to the Herbert theory, which is adopted by the Calcutta Reviewer, the Central Range is not a cordillera either, as it also is broken through by the gorges of the Indus, Sutlej, and Brahmaputra, which is a *reductio ad absurdum;* for, thus, if the theory be correct, there is no Himálayan Range of Mountains at all.

The notion that a chain of mountains must culminate in a continuous water-parting is a fallacy. A great mountain system does, but it usually consists of two or three distinct cordilleras or chains, and some of them are, as a rule, cut through by river courses, though each, also, forms a distinct water-parting of its own. We have seen that this is the case in the Himálayan system, in which the Central and Southern Ranges are both cut through by rivers, though the Northern Range is not. It is also the case in the Andes. In both systems—the Himálayan and the Andean—a chain of mountains, with a continuous series of culminating ridges and a continuous slope, is a true cordillera, whether rivers force their way through its gorges or not. A spur is a ridge running off from the cordillera, and gradually sinking into the plain. A continuous line of peaks along the axis of a mountain system is not a spur, but a cordillera or chain.

In my Introduction I pointed out that the analogy between the two great mountain masses of the Himálaya and the Andes was very remarkable. Both consist of three parallel chains. In both, great rivers have their sources in the inner chain, and force their way through the other two. The cuesta of La Raya, separating the valley of the Vilcamayu from the basin of Titicaca, is the counterpart of the Marian-la-saddle, dividing the basin of the Sutlej from the valley of the Brahmaputra. In both systems numerous rivers rise in the central cordillera, and, after lateral courses between the two, eventually force a way through one or other of the two outer chains. The Southern Range of the Himálaya bears an exact analogy to the outer Andes, which rise from the valley of the Amazon. Both have a low range at their feet, enclosing valleys or *duns;* both have deep gorges, separated by lofty ridges, which are spurs from a main chain of culminating snowy peaks, and in both several rivers rise in an inner central range, and force their way through profound ravines between the culminating summits. The rivers Mapiri and Chuqui-apu pierce the eastern cordillera, flowing through chasms in beds 1800 feet below the snowy peak of Illimani, which almost overhangs one of them. Yet no one maintains that the "Cordillera Real de los Andes" is not a chain of mountains! In like manner the river of Santa, after a long course in a northerly direction, between the Maritime and Central Cordilleras, in the remarkable lateral valley known as the Callejon de Huaylas, at last bursts through a narrow and profound chasm in the former range, and pours itself into the Pacific. According to the Herbert theory, this chasm would also deprive the Maritime Cordillera of its place among mountain ranges.

The theory that a chain of mountains ceases to be one, and becomes a series of spurs, because one or more rivers force their way through its chasms is untenable; and a system based on such a theory would be confusing and erroneous. A cordillera, or chain of mountains, is correctly defined, by the Royal Academy of Spain, as a range or ranges continuing in one direction along a common axis, whether broken by chasms or not. A spur, on the contrary, is an offshoot from a cordillera, gradually sinking into a plain. The Maritime and Eastern Cordilleras of the Andes, and the Central and Southern Ranges of the Himálaya are true mountain chains, with continuous series of culminating peaks, though all four are broken through by rivers. All four also have numerous spurs. In the Andes these spurs form the deep ravines of the montaña, gradually subsiding into the Amazon valley on one side, and the lateral ridges ending in promontories of the Pacific coast on the other. In the Southern Himálayan Range the spurs run out at right angles with the line of culminating peaks, and form the valleys of Bhutan, Sikkim, Nepal, and the rest.

The Calcutta Reviewer attempts to dispute the analogy between the two great mountain systems of the old and new world; but avowedly without any special knowledge of the latter. He tells us that in the mountain system north of India there is no counterpart to the succession of elevated valleys in the Andes. The upper basins of the Indus, Sutlej, and Brahmaputra are their exact counterparts; while the valleys of the Chamto-dong and other Tibetan lakes

are formed by those bifurcations and reunions of the Central Himálayan Range, which also occur in the Andes, and which the Reviewer there calls "unique!" He says that the only instances of elevated valleys in the Himálaya, such as those in the Andes, are Kashmir, Kathmandu, Pokhra, and, possibly, Jumla. The counterparts of the elevated valleys of the Andes are the elevated valleys between the Northern and Central Ranges of the Himálaya, containing the upper courses of the Brahmaputra, Sutlej, and Indus. The lower valleys of Kashmir, Kathmandu, and the rest, have nothing to do with this comparison; although they also have their exact counterparts in the Andean system. The Kashmir Valley is between the Central and Southern Himálayan Ranges, while Kathmandu is on the slope of the Southern Range. The Reviewer's "blunders" (a favourite expression of his) culminate with the notion that the Illimani and Illampu (Sorata) peaks are offshoots of an imaginary lower range nearer to Lake Titicaca, which he calls the "real eastern watershed" (meaning water-parting).

The Reviewer should have refrained from discussing these points relating to the Andes, of which he knows nothing, and confined his lucubrations to the Himálayas, which he professes to have studied closely in nature and on most modern maps. He calls the whole Himálayan system the Indo-Tibetan, and tells us that the key to this Indo-Tibetan system lies in the valleys of the Indus and Brahmaputra, and their affluents. But at the very outset his erroneous geographical nomenclature leads to confusion. To the Northern and Central Himálayan Ranges he gives the names of the "Main Northern Watershed" and the "Main Southern Watershed;" applying the term "watershed" to the ridge or water-parting which is continuous in the Northern Range. It is not continuous in the Central Range, even within the limits that he would prescribe to it, for the Sutlej breaks through it, so that his theory is disposed of by this physical fact at the very outset. The Reviewer assumes that the River Karnali also breaks through the Central Range (his so-called "Southern Watershed"), and so makes his own case still worse. However, the Sutlej certainly does force its way through the famous gorge at Shipki. The Reviewer coolly remarks: "These breaks do not affect the delineation of the Southern Watershed in regard to the Indus and the Brahmaputra, to the valleys of which, and of their affluents, be it remembered, we described it as the limit." But these breaks very materially affect the Reviewer's theory. The "Southern Watershed," as he calls the Central Himálayan Range, is cut through, not only by the Sutlej, but also by the Indus and Brahmaputra, and, consequently, ceases to be a range of mountains at all, from his point of view, any more than the Southern Range. For the Reviewer "disputes the appropriateness, in a geographical sense, of the term chain, or of any other term implying continuity" to the Southern Range, because it is cut through by several rivers. So that, on his own showing, his "Main Southern Watershed" (the Central Range) is no more a continuous chain than the Southern Range. His theory is irreconcilable with the acknowledged physical facts.

The errors in the Reviewer's system are partly due to his incorrect nomenclature, and especially to his calling a dividing ridge or water-parting a "water-shed," which is quite a different thing. The Reviewer says: "As we have the high authority of Mr. H. F. Blanford (*Physical Geography for the Use of Indian Schools*, p. 169) that the last syllable of water-shed is derived from the Anglo-Saxon *sceadan*, to part or divide, we see no reason to abandon the older and better-known term." Mr. Blanford has adopted a mistake which is natural enough, and which is made in the 1868 edition of Webster's Dictionary. Misled by the similarity in sound, it was supposed that *water-shed* and *wasser-scheide* were one and the same. It is important that the definitions should be again clearly stated, for systematic geography is impossible without accurate nomenclature.

In English geography a *water-parting*, called a *divide* by the Americans, *wasser-scheide* by the Germans, and *ligne ou faîte de partage des eaux* by the French, is the ridge which separates the flow of water on either side of a range of hills. The German *scheiden* means to divide or part. A *water-shed* is the space intervening between the water-parting and the bottom of the valley down which the water is shed. It is called *abhang* (slope) by the Germans, and *versant* by the French, from *verser*, to shed. The English words *shed*, *shade*, and *scatter* are all, according to Richardson, derived from the Anglo-Saxon *sceadan*, to cut, and hence Mr. Blanford's mistake. But the English word *shed* means to flow off, and a *water-shed* is a flowing-off of water. A shed to shelter cattle has its name not from the ridge of the roof, but from the slope which sheds off the water. And so with a mountain, the water-shed is not the water-parting, or dividing ridge, but the slope down which the water flows from the ridge to the river in the valley below.

The Calcutta Reviewer's confused notions of geography have led him into the mistakes which I have pointed out. In reality, the Southern Himálayan Range is clearly defined by its numerous snowy peaks, which are the loftiest in the world. Behind it is the Central Himálayan Range; and the system is completed by the Karakorum and Gang-dis-ri Mountains, which I have called the Northern Range. The analogy between the Himálaya and Andes is exact as regards their three parallel cordilleras. The true difference between them is that in the Andean system the central cordillera nearly forms a complete water-parting, and the Maritime and Eastern Chains are cut through by numerous rivers; while in the Himálaya the complete water-parting is the northern or outer range, and rivers force their way through both the Central and Southern Ranges. Thus in the Andes the rivers flow off in two directions, to the Pacific and to the Amazon Valley, while the Himálaya drainage is all to the plains of India.

The Reviewer's geography is bad, but the general tenor and object of his article is even worse. He attacks the Introduction to the *Narrative of the Mission of George Bogle to Tibet*, because it advocates the renewal of free communication between Tibet and India, and his tactics are comprised in an elaborate and laborious attempt to discover any error, however trivial, on which to descant. As the re-opening of unfettered intercourse with Tibet is not only a matter of great geographical importance, but also a very useful measure in other respects, it is by no means undesirable that we should have an exhaustive statement of all that can be said against it. The Re-

viewer is a very promising recruit in the great and too powerful army of obstructives—a zealous student in the school which teaches "how not to do it." It is well, therefore, that we should consider all that can be said from his point of view.

He begins by finding fault with my Introduction on five grounds, namely, that there are repetitions in the foot notes; that there are frequent mistakes in fact; that it contains unreasonable assumptions in regard to questions involving doubt; that mine is an erroneous way of describing the configuration of the Himálaya; and that there are rash drawings in parts of the general map.

The first complaint, against repetitions in the foot notes, is an amusing little bit of hypercriticism. The Reviewer has found out that in more than one place I have explained that Demojong's country means Sikkim, and that Seling is Sining; and he devotes nearly a page to a dissertation on his ability to have remembered these explanations, if they had only been made once.

As regards the "frequent" mistakes in fact, he has, after an evidently most minute and diligent search, discovered ten oversights, most of which are mere errors of the press. I am extremely obliged to him for having taken this trouble, and such of the corrections as I had not previously noted, have come at a convenient moment, in time for insertion in my second edition. Meanwhile I now give them in a footnote, for the benefit of those among my readers who have got the first edition of the *Mission to Tibet*.*

Some of his corrections are absurd. For instance, he finds fault with the word Gorkha being used, instead of Gorkhali. I explain the distinction between the two words in a note at p. 126, but it would be a ridiculous piece of pedantry to adopt the word Gorkhali, when Gorkha (see *Allen's India List*) is always used officially. Again, he objects to my foot-note explaining that the Mutgari of Father Grueber is Motihari, a town then in the district of Sarun. Here his objection is that Motihari is not now in Sarun, but in Chumparun, referring to a very recent administrative subdivision. I was quite correct in describing Motihari as being in Sarun when Grueber wrote, and indeed until very recent years. Chumparun was a subdivision of Sarun, and the district is officially referred to as Sarun *and* Chumparun.

The alleged unreasonable assumptions in regard to questions involving doubt come next. The first appears to be that I intimate that Mr. Hodgson prevented a rupture with Nepal throughout the period of the Afghan war, a fact which is new to the Reviewer. Very likely, for the true history of the supersession contained in unpublished correspondence is not accessible to him; but the facts are, nevertheless, exactly as I have stated them. The Reviewer next takes exception to my suggestion that certain travellers who visited the Teshu Lama, and whom Mr. Bogle calls Kalmuks, were Manchurians; and he is pleased to call this an unfounded assumption. Whether it be so or not, it was made on the highest authority, and is consequently of more value than the Reviewer's crude conjectures about Eleuths, Torguts, and Torbots. Equally unfounded, he declares, is the assumption that the men who obstructed Mr. Bogle's mission were not the people, but the officials. This suggestion was also offered on the highest possible authority, and is in accordance with all subsequent experience.

I have already dealt fully with his lucubrations on the physical geography of the Himálaya, and his remarks on the map will be disposed of by Mr. Saunders in our next number; as a satisfactory discussion of the points raised will require a map for their illustration.

These criticisms, though occupying considerable space, are apart from the main intention of the review, which is to advocate a policy of inaction. But my Introduction must first be discredited. The wells must be poisoned. One instruction in this counsel's brief is to abuse the plaintiff's attorney, and this instruction is carried out to a wearisome extent before the main point is reached. Let us now hear what he has to say against the establishment of free communication between India and Tibet.

His theory is that the through trade with Tibet fully recovered itself about twenty-five years ago, and that in the nature of things it has not since increased, and never will increase, in any appreciable degree. He urges that Warren Hastings did not effect anything by his missions; but this is a mistake, for they were followed by the establishment of the fair at Rangpúr which promoted and increased the trade between Tibet and India. A policy opposed to that of Warren Hastings, a policy which is represented by the abolition of the Rangpúr fair, the petty frontier wars, the discouragement of exploring enterprise, and the sealing of the passes, has obliterated the good effects of the Trans-Himálayan missions. But the Reviewer's main contentions are that the trade with Tibet can never be of any value; while many of the passes are very difficult and devoid of resources. The passes are certainly difficult and devoid of resources, as are many of those in the Andes through which trade flows. It is on this account that I have dwelt on the importance of opening all the passes, and not confining the traffic to one route.

The wool of Tibet, he declares, could not compete with the Australian staple, on account of the cost of carriage, although it might be had in any quantity, but he gives no ground for this assertion. It is an "unfounded assumption," to use one of the Reviewer's phrases. It so happens that there is likely to be a large and special demand for the peculiar wool grown at high elevations, such as that of the Tibetan sheep; and if free communication was opened, the wool trade with Tibet would eventually become very important. In the same way, the immense demand for tea in Tibet will eventually find its supply from India. But the great question with the Reviewer is "how not to do it;" so the wool—the real wealth of Tibet—is

* Page vii. line 17—*For* 15th and 16th, *read* 17th and 18th.
„ xxxv. „ 16—*For* Bhei *read* Behri.
„ xlv. „ 16—Omit *each of*.
„ xlvii. „ 4—*For* "was contemporary with Tsong-khapa having been born in 1339," *read* "is said to have received the spirit of Tsong-khapa in 1419."
„ xlvii. „ 28—*After* Avalokiteswara *insert* (or Padma Pani).
„ xlvii. „ 29—*For* Buddhisatwa, *read* Dhyani Buddha.
„ xcix. „ 27—*For* K.C.B., *read* G.C.B.
„ cxii. „ 2—*For* Depon, *read* Depen.
„ clviii. „ 23—*For* 1811 *read* 1812.
„ clxxiv. *note*—*For* 13½ sicca, read 13½ Company's.

disposed of as unable to compete with the Australian staple, while the working of Tibetan gold mines must be discouraged lest such an industry should "disturb the exchanges as much as the mines of Nevada are doing now!" Having thus summarily disposed of Tibetan trade, he next proceeds to defend the ruinous fiscal policy of Jung Bahadur, which has almost destroyed the commerce of Nepal, and the maintenance of an unnecessarily large Gorkha army, which eats up the resources of the State.

He finally points, with satisfaction and complacency, to the small results of the recently-opened trade between the Punjab and Eastern Turkistan, and regrets that he has not the figures to indicate at what outlay the alleged insignificant results have been obtained. The missions of Sir Douglas Forsyth were fruitful in valuable results of various kinds, which were well worth the expenditure. But the obstructives think differently, and this lively specimen of the class concludes with one of their favourite quotations "*Le jeu ne vaut pas la chandelle.*" And so a deaf ear is to be turned to the representations of the great manufacturing interests in Yorkshire, Lancashire, and Scotland, which are called by our sprightly Reviewer "the mercantile clique in the North of England."

Such is the case against the policy advocated in my Introduction to the *Narrative of Bogle's Mission to Tibet.* The obvious reply to it is that the eventual results of opening trade with Eastern Turkistan cannot be estimated by the returns of the first few years, and that the mischief done by obstructives of former ages will probably take a very long space of time to remedy. The same remark will, of course, apply to Tibet. When communication is made free it will necessarily be long before the traffic becomes considerable. But the inexhaustible supplies of wool and of the precious metals which Tibet can furnish will inevitably find their way down such channels as may be opened, first in small driblets, but eventually in a large and continuous stream. For commerce will create new wants, and as these increase the trade between the two countries will advance and prosper. Nor are the good effects of free communication confined to these commercial advantages. Still more important are the establishment of friendly relations, the interchanges of thought, and the extension of knowledge. The appearance of this article in the *Calcutta Review*, advocating as it does a policy of obstruction and inaction, is ominous; and it behoves those who are interested in the welfare and progress of India to exert all their influence to counteract a retrograde tendency which has thus found expression. An English mission from Peking to Lhasa might, by the display of a little firmness, be despatched with the consent of the Chinese Government; an enterprising and judicious English traveller could as easily explore the Tibetan plateau as the Russian Prejevalski; but the mischievous obstruction which prevents the adoption of permanently useful measures of this kind comes from powerful influences, and one of their manifestations is this article in the *Calcutta Review* on "Trans-Himálayan Missions and their Results."

CLEMENTS R. MARKHAM.

GREGOR N. POTANIN'S JOURNEY THROUGH THE ALTAI MOUNTAINS.*

WE only started from the Zaisan post on August 1st (new style), having been much delayed through the difficulty of procuring camels, most of these animals being then employed in carrying corn to Gacho. We reached Bulun-tokhoi in seventeen days, travelling along the new carriage road leading through the valley to the north of the Saur mountains. Bulun-tokhoi we found occupied by a sotnia of Russian Cossacks, who had taken up their quarters in a Chinese temple.

We left Bulun-tokhoi on August 20th. We followed the eastern shore of Ulyungur lake, crossed the deep and rapid Black Irtysh at Durbeljin in a ferry-boat, and on August 29th arrived on the banks of the Kran, near the rock, which gives its name to the Chinese town of Tulta, about twelve versts higher up. During the march we had suffered much from the heat and from flies. When we reached the Kran most of the vegetation was in its last stage, hoar-frosts had set in, and most of the corn had been harvested. The whole of the valley of the Kran, from the Phara-sumé monastery down to Balbagai, a distance of 10 or 15 versts is occupied by the fields of Eleuths and Kirghiz. It is the granary of the eastern Ektag Altai, and the Kirghiz, as far as Kobdo, come hither to purchase their corn. Poppies are likewise cultivated extensively, and much opium is exported to Kobdo and Bulun-tokhoi. On the day after our arrival, August 30th, we started for the monastery of Phara-sumé, distant about 10 versts, it being our intention to convey presents to the Tsagan-gygen, and to ask him for a guide. We were met, soon after our departure, by a body of men, who demanded that we should retrace our steps. Two officers intimated that it was too late to pay a visit to the Tsagan-gygen on that day, and advised us to return on the morrow, when they would conduct us over the town and the temple. We consented, but on the following day no conductors appeared, only a few Mongols showed themselves, and they positively declined to take us to any of the officials The authorities of the Chinese town, it appears, had instructed the people to act in this manner, and all the answer we could get to our inquiries was "*arjur*"—be off! We decided at length to start for the monastery and the Chinese town near it without a guide, and to pray the monks to grant us one. On approaching the largest of the temples, not yet completed, we found ourselves surrounded by a body of powerful-looking monks, who ordered us to dismount from our horses. We were taken to a small square of the town, and, after having been kept waiting there for two hours, an officer of police made his appearance and declared that he could not allow us to proceed until we had exhibited our passports. As these were with the caravan we were obliged to submit to being confined in the house of a lama during the night. Our host was very loquacious. He placed before us tea and mutton, of which he declined to partake himself, as he declared we were being entertained at the expense of the Bogdo Khan. On the following day, September 1st, we had to appear before a Mongol official – our interpreter said he was

* Izv. XII., pp. 427 and 501.

governor of the town. He sat on a bench in a small room; a little table stood near him, and upon it we saw our passports. Four soldiers in yellow jackets were at his side. We were accused of having entered a peaceable town with arms, and of having committed sacrilege by approaching a temple. We complained of not having been met by the local authorities. Our interlocutor asserted that they had only heard of our presence after we had approached the temple, and knew nothing about the officials whom we claimed to have met on the evening of August 30th. The authorities evidently desired to settle this business in a peaceable manner, and we were given to understand that on our saying no more about this incident we should be granted the support of the Tsagan-gygen. We declared, however, that we should not fail to inform our Government of what had happened. The governor then asserted that our passports only authorised us to proceed to Kobdo by the road of pickets. We declined to accept this interpretation, Our passports were then restored to us, and we were told that the authorities declined all responsibility for what might happen during our journey.

Whilst staying in the valley of the Kran, the Kirghiz came down from the mountain-pastures, and we succeeded in obtaining fresh camels and horses in the aul of a Kirghiz trader, Jurtnai. The road up the narrow forest valley of Kandagatai was steep and difficult. The accounts which we heard of the difficulty of crossing the Jamaty Pass at the head of the Black Irtysh, and the approach of the rainy season, induced us to cross the Altai by a more southerly pass, the Urmogaity, which is near the source of the Kran, and has a height of 9000 feet. We did not meet with snow, but during the winter snow lies to a considerable depth on the western slope of the mountains, putting a stop to all communications, and compelling travellers to follow the picket-road in the Bungan Valley when desirous of proceeding from Bulun-tokhoi to Kobdo. During our journey from the source of the Kandagatai to the Urmogaity it snowed frequently, but no snow at all was met with on the eastern slope of the Altai. In fact, precipitation is more abundant on the southern slopes. This accounts for the forests of pines and larches met with in the valleys there, and the barrenness of the eastern slope. At the eastern foot of the Urmogaity Pass we came upon the Dann-Kul, an alpine lake giving rise to the Kutan, which falls into the river of Kobdo. On this lake we met with Kise Kirghiz, who had crossed the Altai seven years ago, and spread eastwards along the valley of Kobdo and its tributaries. The last Kirghiz were met with on the Tal-nor, about three or four days' journey from the town of Kobdo. The country to the east of the Urmogaity resembles a hilly table-land, and abounds in lakes. To the east the plateau descends in terraces, separated from each other by mountain-ranges. The last of these ranges runs north and south, and separates the terrace of the Dyaliun River (a tributary of the Buyantu) from the trough-shaped valley in which lies the town of Kobdo. We crossed this range in the Terekty-asu Pass (10,000 feet), descended its eastern slope to the Buyantu River, and reached Kobdo on the 16th October.

Our collection of plants contains up to the present only specimens from the Ulyungur basin, as the Alpine flora of the southern Altai was already withered when we reached there. Of birds about 340 specimens were procured. We also collected mineralogical specimens. A route survey has been made, three latitudes and numerous altitudes have been determined, the latter barometrically. At Kobdo we met several Russian merchants, who had come there from Barkul.

(Potanin spent the winter at Kobdo.)

THE NAVIGATION OF SMITH SOUND AS A ROUTE TOWARDS THE POLE.*

My present paper on the navigation of Smith Sound will, I trust, be accepted as a continuation of the one on the Polar area, which I recently had the honour of reading before this Society, rather than as being an exhaustive description of the locality.

Our knowledge of the water-passage leading from Baffin Bay into the Polar Ocean is derived from observations made by explorers who have passed eleven summers and six winters in the neighbourhood.

Of the four expeditions specially equipped for the exploration of Smith Sound, three were despatched from the United States and one from this country.

In 1852, the present Admiral Inglefield visited the entrance of the Sound, and discovered the south shore of Grinnell Land; also that the coast of Greenland, north of Cape Alexander, trended to the north-east for a considerable distance, but he did not land on either shore.

In 1853, Dr. Kane, with his small sailing-vessel, was the first who succeeded in forcing a passage within the sea; but, after a most determined and spirited struggle, he was finally imprisoned by the ice in Rensselaer Bay for two winters. From thence one of his sledge-parties, under Morton, explored the Greenland shores to Cape Constitution; and another, under Dr. Hayes, landed on Grinnell Land; both journeys displaying the very highest qualities in all engaged in them.

He was followed in 1860 by Dr. Hayes, who, unable in his sailing-schooner to enter the sea, was forced to winter in Port Foulke. In the following spring, after a most harassing and determined march across the heavy polar pack in Kane Sea—over which he found it impossible to drag his boat—he ascended Kennedy Channel; making one of the most brilliant Arctic sledge-journeys on record.

In 1871, Captain Hall, in a small steam-vessel, made his most successful run to the head of Robeson Channel, where he was stopped by ice, and forced to winter in Polaris Bay. From thence, sledge-parties explored to the northward of Newman Bay; but, like all previous travellers, except Sir Edward Parry, they were unable to drag their boats over the rough ice. On her return voyage, the 'Polaris' was caught in the pack and driven into Lifeboat Cove, where she was obliged to be run on shore.

In 1875, the most powerful Expedition of all, consisting of two steam vessels admirably equipped, was sent out from this country under my command. We

* Read at a meeting of the Royal Geographical Society, by Sir G. S. Nares, K.C.B., March 26th, 1877.
See map of Smith Sound in our number for January last.

succeeded in reaching the head of Robeson Channel, where we were stopped by the ice, and passed the winter on the west shore of the channel.

Sledge parties explored the whole of the neighbouring shores, and determined the existence of an extensive sea; but, like all our predecessors, we were unable to transport navigable boats for any great distance across the ice, away from the land, during the short season when exploration by means of sledging is possible.

As experience shows that, in all but very exceptional seasons, the position can be yearly visited from the southward, the neighbourhood forms a valuable and important base for exploration in more northern latitudes. It is, in fact, the most northerly position, where an abundance of game is procurable by experienced hunters within a restricted area. At no other northern position yet explored is game now to be obtained in sufficient quantities to enable even a party of Eskimo to exist throughout the year on their own resources.

On the opposite coast of Ellesmere Land, on the west side of the channel, the country in the interior is not so completely buried in ice, and the mountain tops all project above the ice-cap.

South of Cape Sabine, however, the glaciers on the hill-sides extend into the sea, and so few bare places are left fit for feeding grounds. To the north of Cape Sabine, along the southern shores of Hayes Sound, the line of perpetual snow and ice—as on the Greenland coast—is at a considerable height above the sea-level; consequently the glaciers, instead of extending to the sea, are fronted by vegetated valleys and heights free from ice.

One spot partially explored by the late Expedition—Twin Glacier Valley and the heights about Alexandra Haven—exhibited many recent traces of Arctic life; and the numerous ancient Eskimo remains found there would denote that game had always frequented the neighbourhood.

An exploring party travelling up Hayes Sound, on the interesting duty of ascertaining whether a water-passage exists extending to the Western Sea, may therefore expect to obtain a small supply of fresh food on the south coast of Grinnell Land. North of Hayes Sound, the mountains are remarkably free of any ice-cap; the valleys contain small glaciers; but extensive tracts of land are free from snow during the short summer, yet the locality is decidedly unfavoured by game. While our ships were detained by the ice near the coast, only a few hares and ptarmigan were obtained. Sledge-travellers will be unusually fortunate if they there obtain any game at all.

In Rawlings Bay, at the south entrance to Kennedy Channel, a few ancient decayed musk-ox bones were found; but I think that few of these animals wander so far away from the more favoured grazing grounds in the large valleys near Mount Grant, in the United States Range. As we advance to the northward, up Kennedy Channel, the sea-life rapidly diminishes, and the bears who prey upon it are found in ever-decreasing numbers. At Polaris Bay, where the winds and currents contribute to keep the water-spaces more open than elsewhere, a few seals and sea-birds congregate during the summer. North of Robeson Channel, few, even of these are met with, and the bears are quite left behind.

The coast of Greenland, bordering these seas, so far as can be sighted from the sea, lies completely imbedded in ice—in summer as well as in winter—without one mountain peak showing itself above the very slightly inclined skyline of perpetual ice.

The glaciers descending from this ice-cap are, however, mostly melted before reaching the coast, leaving a border of land clear of ice near the sea.

Hartstene Bay, situated at the head of Baffin Bay, on the Greenland shore, is washed by a warm current coming from the southward; and is protected from the cold Arctic flow by the projecting promontories, which form the western capes of Greenland. In consequence, the neighbourhood, as first pointed out by Dr. Hayes, enjoys a comparatively mild climate; and on the vegetated lands fronting the ice-cap, as well as in the neighbouring sea, Arctic life is found in its greatest abundance.

Throughout the whole area north of Smith Sound the migratory birds in small numbers rear their young in the favoured valleys and plains during the short summer.

The nearer we approach the Pole, the later in the season does the sun make its appearance, and the lower the altitude it attains at noon. Consequently, the spring and the reanimation of the non-migratory Arctic life are more backward.

At the Pole, the birds can have very little time to spare between the late spring and the returning autumn frosts in which to rear their young. So pressed are they for time that, as I have already related, many that visited Floeberg Beach, finding the season more backward than they anticipated, were obliged to return to a more favoured locality farther south. Thus I reason, that as we advance to the northward, less dependence can be placed on obtaining an appreciable supply of winged fowl.

With regard to migratory birds in high northern latitudes, it is remarkable that the men of our party who resided at Polaris Bay during July and August, the best season for game, and who were extremely anxious to obtain a supply for the use of their sick comrades, were unable to find birds in as great numbers as the crew of the 'Polaris' had found them at the same place. And I cannot but conclude that the birds resort yearly to the same locality for the purpose of breeding, and that when they are all shot down in any one neighbourhood, it takes some years before that neighbourhood becomes fully stocked with game again. This opens up the question as to whether the large number of necessarily ruthless sportsmen who last year hunted the district between Lady Franklin Sound and Cape Joseph Henry have not for a time devastated that district by destroying all the parent birds.

The same consideration will apply to musk-oxen; for Hans, the Eskimo, who was the most successful hunter on board the 'Polaris,' in 1872, could find none of these animals on the same feeding-grounds in 1876.

It will be convenient if we consider the district under discussion as consisting of two narrow channels, Robeson and Kennedy Channels; and two broadened parts or seas, Hall Basin and Kane Sea, with Smith Sound or Strait as an outlet into Baffin Bay. During the navigable season, that is during August and the first week of September, after the ice has broken up, and is drifting about at the mercy of the winds and

currents, in consequence of the prevailing winds coming from the westward and the ocean current from the northward, the shores of the channels and seas having a north-westerly aspect are more liable to be encumbered with ice for long periods than those with a southerly or easterly one. This consideration, coupled with the knowledge that Dr. Kane, although working with remarkable patience and perseverance, was unable to force his way beyond Rensselaer Bay, on the south-east shore of Kane Sea, and was imprisoned there the following season, owing to the ice in the neighbourhood never permitting him to move, determined me, both when going north and returning, to keep on the western shores as much as possible.

In a channel of varying breadth, owing to the strength of the winds, tides, and ocean-currents being greater in the contracted than in the broad channels, the ice is more readily carried away out of the narrows and deposited in the more sluggish waters of the broadened parts.

Thus, in Kennedy Channel, there is comparatively a free navigation throughout the summer; while in Kane Sea there is a great accumulation of ice, with a constant influx at the north end, and a discharge into Baffin Bay at the southern entrance. At the latter point, where the ice is first met with when coming from the southward, as the current runs strongest in the offing than inshore, the southern edge of the ice, extending across from Cape Sabine towards Littleton Island, assumes a horse-shoe shape, curving to the northward, with a water-space in mid-channel, from whence the ice is readily carried to the southward. Thus, vessels arriving from Baffin Bay are usually able to penetrate for a short distance farther north in this bight than they can do by keeping among the more closely-packed ice inshore; but they are sure, sooner or later, to meet the edge of the main pack-ice in Kane Sea. It can only be in very rare seasons that the water-bights can extend so far north as to communicate with the more open sea in Kennedy Channel. Once up to the edge of the ice, a never-ceasing battle commences between the voyagers and the elements; no one moment can be lost, and there is little limit to the risk which has to be run. Dangers elsewhere have given rise to the saying, "There's a sweet little cherub that sits up aloft to look out for the life of poor Jack." I know of no place where it can be used more appropriately than in connection with navigation through heavy ice.

It is a mistake to suppose than the 'Polaris' did not encounter ice in this part as she ran to the northward. From a position near Littleton Island, she steered a direct course for Cape Fraser; but found that she was running into a bight in the ice. Captain Hall then turned to the south-west, and, rounding the edge of the pack, passed up to the northward close along the western shore, through a water-channel existing between the pack and the land, in the same manner as the 'Alert' and the 'Discovery' did; the only difference being that while we had to fight for every mile, the 'Polaris' fortunately found a continuous channel, probably owing to a previous westerly wind.

In Hall Basin there is an accumulation of ice similar to that in Kane Sea, with a few open water spaces in the narrowest part of Robeson Channel. But the large stores of ice in the Polar Sea to the northward, and in Lady Franklin Sound to the westward, readily movable by the prevailing wind, renders the navigation of this part of the channel even more difficult and dangerous than in the larger but somewhat similar Kennedy Channel. In conducting a vessel to the northward, the greatest difficulties may be looked for when passing along the shores where the pressure of the current sets against the land. This is particularly the case near the southern exit to the two broad seas, Hall Basin and Kane Sea. Happily both are furnished with good and convenient harbours.

Cape Sabine, a difficult point to pass, has Port Payer most advantageously situated for use as a resting station, while waiting for a westerly wind to blow the ice out of Hayes Sound, and open a passage to Victoria Head and to Grinnell Land. If stopped on the way by the ice, the grounded icebergs in the indentations on the east side of Bache Island will afford a slight amount of protection; but, after leaving Port Payer, Norman Lockyer Island and Walrus Shoal are the only secure resting-places until Bessels Bay or Discovery Bay is reached; both of which are valuable harbours, although the former is rather encumbered by icebergs.

The open bays on the south-east coast of Grinnell Land, owing to their large size, afford very little protection to a ship. In the early season they are generally filled with one season's ice of ordinary thickness, in which a dock may be cut when the ship is compelled to wait; but by the middle of August, the height of the navigable season, this bay-ice has generally broken up and drifted out, giving place, when the wind blows on shore, to the heavy Polar ice from the main channel.

Wherever large icebergs have grounded in clusters near the land—as is the case inside Washington Irving Island, north of Hayes Point, and in Joiner Bay—if the ice inshore of them has broken up and drifted out of the way, they often afford convenient protection from immediate danger when the outer ice closes in. At other parts, such as Maury Bay, small ones become stranded, and are useful as fixed stations to which the ship may be temporarily secured; but if the outer ice closes in with force, both the ship and iceberg or floeberg, whichever it might be, would be forced upon the shore. With this consideration, a light draught of water is of the utmost importance in an Arctic vessel.

North of Baffin Bay, ice-saws are only of use when meeting with the one season's icefloes of from 3 to 6 feet in thickness, which have been formed in the bays during the previous winter. The usual saw is far too short to make any impression on the thick ice found in the main channel, most of which has drifted to the southward out of the Polar Ocean.

Also, as steamers are called upon to navigate through very close ice and channels only as broad as themselves, there is very little time given to think of docking. The greatest judgment is required by whoever is in command; and the danger of the ice nipping together must be somewhat disregarded, if any advance at all is desired. Icebergs form an important feature in the navigation. To the northward of Cape Sabine, the only discharging glaciers are those in Dobbin Bay and Rawlings Bay on the Grinnell shore; and Peabody Bay and Bessels Bay on the Greenland coast.

The icebergs broken off from the front of the discharging glacier which completely fills up Petermann Fiord are so small, that they cannot be considered as in any way affecting the navigation of the district. In Robeson Channel, and in the Polar Ocean to the northward immediately in its neighbourhood, there are no icebergs. Of those which escape out of Bessel Bay, a few drift towards the north, and become stranded in Polaris Bay, where one sheltered the 'Polaris' during her winter stay. The greater number drift at once to the southward, through Kennedy Channel, without grounding, owing to the depth of the water and the strength of the current. There are few icebergs met with in mid-channel north of latitude 80° N. South of Rawlings Bay, where the channel expands into Kane Sea, they become stranded, and stud the shores on both sides. A navigator passing a cluster of these carefully notices the amount of protection it would be capable of affording, were he forced to retreat by the ice closing in ahead.

Kane Sea is thickly studded with floating icebergs. All the large ones derive their birth from the Humboldt Glacier, and their drift readily marks the general movement of the ice. From the high land about Cape Louis Napoleon, 2000 feet above the sea, the heavy chain of the bergs in Peabody Bay fronting the Humboldt Glacier—through which Morton from Dr. Kane's vessel had such difficulty in advancing when making his splendid journey to the north—is distinctly visible at about 50 miles' distance. A few of these drift across to the western shore, but the majority are carried to the southward on the east side of the channel. On all occasions those which are driven into the offing indicate the faster drift of the main body of the ice in mid-channel compared with that nearer the shore. This is also well shown by the drift of the 'Polaris.' Caught by the pack and borne onward by the full strength of this current, she drifted from the south entrance of Kennedy Channel, in an almost direct line, to the neighbourhood of Littleton Island—between the middle of August and October—a distance of 120 miles in sixty days. Her drift also shows that, although all regular navigation is over for the season by the middle of September, the ice is not firmly frozen before October or November; but after the latter month all motion ceases except in the very narrow channels.

A strong current, even when the temperature of the water is very low, is a powerful agent in retarding the formation of ice, and in preventing ice once formed from increasing in thickness as fast as it would if the water were stationary. It also decays and destroys the ice before the power of the sun is able to make itself felt.

In Bellot Strait, leading westward out of Prince Regent's Inlet, where the tide runs with great rapidity, Sir Leopold McClintock informs us that the water remains unfrozen throughout the winter. In other narrow channels the ice only attains a minimum thickness, even during the coldest weather. Early in the spring, long before the temperature rises above the freezing-point, the ice in the narrows decays and *polynias* are formed, surrounded by fixed firm ice.

I therefore reason that because Robeson Channel was open nearly all the winter of 1871-72, it does not necessarily follow that the ice in the Arctic Sea was also in motion; and yet I cannot take upon myself the responsibility of suggesting that the ice in that sea always remains unbroken as late in the season as it did last spring, that is until the middle of July. Were we perfectly certain that the ice in the Polar Ocean always remains stationary until even the end of June, sledges unprovided with boats might be despatched, and the possibility of reaching a higher latitude would then be very considerably increased.

THE MORAL SCURVY.

II.

THERE is a decided improvement this month, and the only new patient with scorbutic symptoms is a writer in the *United Service Gazette* of April 14th, 1877. He is rather bad, for he will not take his lime-juice, protesting emphatically against the cure that we must nevertheless apply. He says: "We must emphatically protest against such articles as that on 'Moral Scurvy,' which appears in a periodical edited by an 'Old Arctic.' who has done much to bring the late Expedition into disrepute, by adopting a course which all concerned must heartily endorse as realising the truth of the maxim, 'Save us from our friends!'"

In other words the moral scurvy is to be allowed to spread unchecked. Mis-statements, false insinuations, and unjust accusations are to be sown broadcast, and no word is to be spoken in defence. It is not by maintaining the right and speaking truth that the Arctic Expedition can be brought into disrepute; and we shall take care that no attempt to misrepresent its proceedings or to suggest imaginary shortcomings remains unexposed.

We believe, however, that much of this deplorable misrepresentation is made in good faith, and that it is due, almost entirely, to the unscrupulous assertions of the *Sanitary Record*, which have been accepted without due inquiry and investigation.

Our present patient insinuates that there was no systematic training of officers and men for the sledging campaign in the spring. He is mistaken. As in former expeditions, so in that of 1876, the sledge crews and officers were regularly, and for the last fortnight daily exercised and trained for the work. His next insinuation is that the weights were excessive. This is equally devoid of foundation in fact. The greatest weight per man on leaving the ship, 236 lbs. for the northern division, was considerably less than that adopted by McClintock in 1853, and was not excessive. McClintock's weight per man, on leaving the first depôt, was 253 lbs. Parry's weight per man, in his attempt to reach the Pole, was 268 lbs. Equally groundless is the assertion that there was an undue allowance of spirits. The sledge dietary of 1876 actually differed from all those of former expeditions in the fact that the allowance of spirits was reduced by one-half.

We have reserved for the last the most unfounded charge of all, contained in the following sentence:—"The best fitted-out expedition that ever left these shores had its success marred by neglect of attention to the most ordinary sanitary and prophylactic rules." The expedition was not the best fitted-out that ever left these shores, it was not unsuccessful, and there was no neglect of ordinary sanitary and prophylactic rules. The expedition laboured under some special

disadvantages as compared with former expeditions, particularly in not being fitted with a warming apparatus and other conveniences which were so conducive to health and comfort on board the 'Assistance' and 'Resolute' in 1850-51; and in being supplied with salt beef of very bad quality; while in no one respect was it better fitted out than the expeditions commanded by Austin and Belcher. We need only refer our readers to the articles in our numbers for December 1876 (page 312), and January 1877 (page 1), for proofs that the expedition was not unsuccessful. As for the charge of neglect of sanitary rules, it is without any justification. The closest attention was paid to all the sanitary regulations which experience had shown to be useful, and which were established by the precedents of former expeditions.

The editor of a publication, which he calls *Truth!* in his number for April 19th, 1877 (p. 485), returns to his fruitless work of misrepresentation. We are again treated to the usual virulent abuse, including imputations of "mismanagement," "incompetence," "disasrtous failure," and the like, and with the positive assertion that our "*opinion, publicly expressed, is that lime-juice is not an anti-scorbutic, and that its use is not necessary either at sea or on extended sledging parties.*" It will be charitable to suppose that this assertion is intended as a joke, though it is a very dull one. It certainly is not *truth*.

The best anti-scorbutic is generally believed to be fresh vegetables, and the best substitute for them is lime-juice; but we have pointed out that lime-juice alone is not sufficient entirely to prevent scurvy (see our number for January 1877, p. 4 and p. 16). We have also shown that in the late expedition lime-juice was properly administered to every soul on board both ships, every day, with the utmost regularity; and, we may add, that much greater care was taken on this point than was the case in several previous expeditions. We have explained that the outbreak of scurvy in the sledge parties was not due to the want of daily rations of lime-juice for two reasons. One is that lime-juice was never before used as a daily ration for sledge parties which did not suffer from scurvy: the other is that a sledge party of 1876, which started when the weather was warmer, and which, therefore, had daily rations of lime-juice, did suffer from scurvy. We have shown that Captain Nares was justified in not loading the sledges with frozen lime-juice in bottles, during April, because, as every one knows who has travelled in the Arctic Regions in that month, it could not have been used. He followed the best former precedents, established by McClintock, McClure, Collinson, Osborn, Ommanney, Hamilton, Rae, Hayes, Payer, and others, none of whom ever took lime-juice as a daily ration for their sledge parties. If lime-juice can be supplied in the form of lozenges, biscuit, or in any form in which it can be used, we shall be among the first to advocate its adoption as part of the daily ration in April sledge-travelling.

As regards lime-juice the late expedition presents an exactly parallel case to former expeditions which escaped the scurvy. Consequently, the cause of the outbreak must be sought for in some difference between the cases, and we have pointed out what that difference was in our number for January 1877, p. 4.

RETIREMENT OF COLONEL T. G. MONTGOMERIE, R.E., F.R.S.

THE Department of the Great Trigonometrical Survey of India has suffered serious loss by the retirement of its senior Deputy Superintendent, Colonel T. G. Montgomerie, R.E., F.R.S. The following account of his services is given in the Report for 1875-76:—

"Lieutenant Montgomerie entered the Department in October, 1852. Soon afterwards he was present at the Base-lines of Chach and Karachi, in both of which measurements he took a leading share. In 1855 he commenced the topographical survey of the dominions of his Highness the Maharajah of Kashmir, which he finished within the next nine years. The scale adopted was varied from 2 to 8 miles per inch, the area amounts to some 20 square degrees or about 77,000 square miles, which include the stupendous mountain ranges of Kárákuram, Chángchenmo, Bárálácha, Muztagh, &c.; the chief towns fixed were Jummoo, Srinagar, Leh, Skardo, Hanle, Muzaffrabad, Kishtwár, Badrawár, Bárámúla, Dras, Bij, Behára, Nanshahra, Rajauri, Kargil, &c.; the principal rivers traced were the Indus, Jhelum, Chenab, Zánskar, Shyok, Kishanganga, Astor, Karakash, &c.; and of snowy peaks (rising from 16,000 feet to the culminating height of 28,250 feet of the peak at the north-east head of the Baltoro Glacier) may be mentioned Nanga-Parbat, Haramukh, Harámosh, Rákipúshi, Ser Mer, Kárákuram, Bárálácha, &c.; the area of glaciers in this region extended over more than 1400 square miles, and the heights ascended surpassed those recorded up to that time as reached by men unaided by balloons. Lieutenant Montgomerie's name will long continue to be most honourably associated with these operations, which for magnitude, merit, and importance are unsurpassed.

Returning, in 1866, from an absence on furlough for two years, Captain Montgomerie directed the survey of Kumaun and Garhwál with much success. As regards local surveys, those of Mussooree, Kosi Valley and Ranikhet were conducted by him, the last presenting an instance of uncommon dispatch, as it was begun in January 1870, and its eleven maps stood published in the following November. Lastly, he superintended the Trans-Himalayan explorations which have contributed so largely to our knowledge of countries that before were almost unknown. It is exceedingly difficult to give an idea of the provinces thus pierced or circumscribed; a brief attempt is however made in the following descriptions of the routes traversed. From Kumaun northwards to the sources of the Sutlej and Indus, and along a great length of the Brahmaputra eastward through Great Tibet to Lhasa. From Darjeeling westward to Kathmandu, thence over the Dingri Maidan to Shigatze in Great Tibet, onwards in a north-west direction round the Tengri-Nur Lake, and then southwards to Lhasa. From Kabul, *viâ* Bámián and Balkh to Faizabad and Kila Panjah, thence onwards through the Pamirs to Yarkand and Kashghar in Eastern Turkestan and so back to the Karakuram Pass. From Balkh, near the Oxus, to Karshi and Bokhara. From Peshawar to Dir, Chitral, and Zebak, in Badakshán, &c. These routes represent a total length of fully 4500 miles, along which our geographical knowledge has been substantially established.

Lastly, Colonel Montgomerie officiated as Superintendent of the Topographical Survey for a while, and as Superintendent of the Great Trigonometrical Survey for two years; in addition, his services have repeatedly been honourably mentioned by the Secretary of State, and by the Government of India. Nor are distinctions at home wanting, for he is a Gold Medallist of the Royal Geographical Society, as well as a Fellow of the Royal Society. His distinguished services in this Department will be long remembered in connection with his works, and many kind wishes from those with whom he was here associated, will continue to follow him in his retirement."

MR. STANLEY'S MAPS.

WE reproduce from the *Daily Telegraph* the maps which have been received from Mr. Stanley. The first represents what he observed and heard respecting the Lukuga outlet of Lake Tanganyika, which was discovered by Commander Cameron, (see our number for March, 1875, p. 72), on May 3rd, 1874. Mr. Stanley went about five miles beyond the point reached by Cameron, and his therory is that the Lukuga is not yet an outlet, but that it will soon become one. We inserted an extract from the *Daily Telegraph* containing all that Mr. Stanley tells us respecting the Lukuga, in our last number (p. 106); and our existing knowledge points to the conclusion that there is a continuous channel bed from the lake to the Luindi River which flows into the Lualaba; but that it is generally dry in Stanley's Mitwansi tract, and that there is only an outflow from the lake at intervals of several years.

The second map refers to the basin of the Kitangulé River which was discovered by Captain Speke in 1861, and which drains the kingdom of Karague, Rumanika's country. Speke discovered a lake, which he called the Little Windermere Lake, and the Ingezi and Luchuro rivers, and he found that all these combined to form the Kitangulé River. He navigated the Little Windermere and found that it communicated with the Ingezi. The valley of the Ingezi was very extensive, and several feet deep in water, resembling a lake grown over with the tall papyrus-rush. He also saw the Luchuro Valley, and that the water in it was of the same nature as the Ingezi, but somewhat larger, being navigable as far as Ruanda. During Speke's six week's residence at the capital of Karague he saw the Mfumbiro cones in Ruanda, and ascertained the existence of a lake called Akenyara, belonging to the Kitangulé system. Captain Speke crossed the river Kitangulé on the 16th of January, 1862. Mr. Stanley reached the capital of Rumanika, the chief of Karagué, in March, 1876. He gives the name of Kagera to the Kitangulé of Speke, and reports that the Ingezi is a series of lagoons and reed-covered waters connected with each other, which is just what Speke describes it to be. In continuing his journey to the south, Stanley reports having come in sight of Speke's lake Akenyara, to which he gave the name of Alexandra Nyanza. See also our number for September, 1876 (p. 246).

Reviews.

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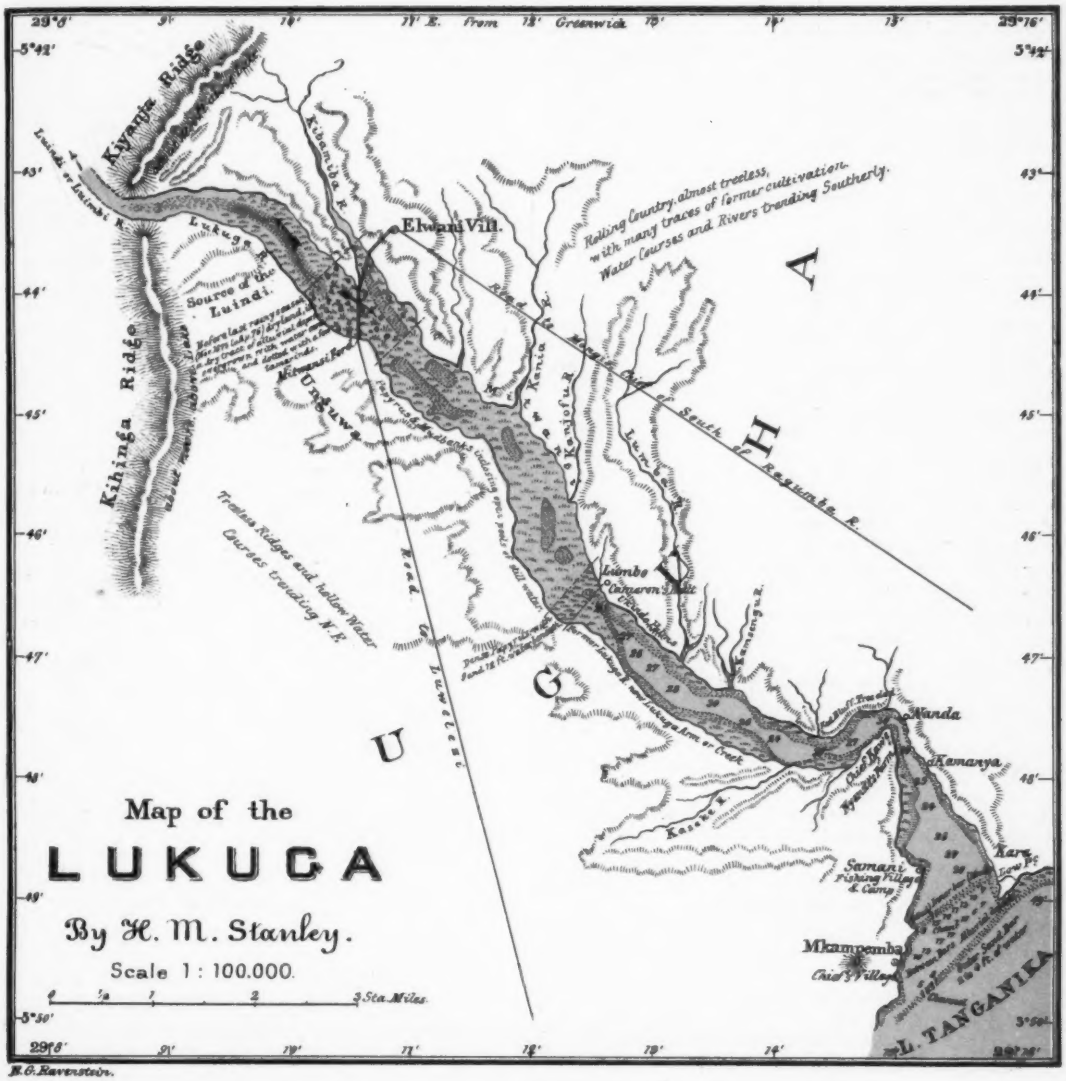
BRITISH GUIANA.*

BRITISH GUIANA, our only colony on the mainland of South America, forms a part of that great territory which had such a mysterious influence over Sir Walter Raleigh; and, except a narrow strip along the coast and a few settlements on the three principal rivers, it remains in the same state as it was in his time. The interior consists first of vast forests and then of savannas and mountains rising to the watershed which marks the boundary between the colony and Brazil.

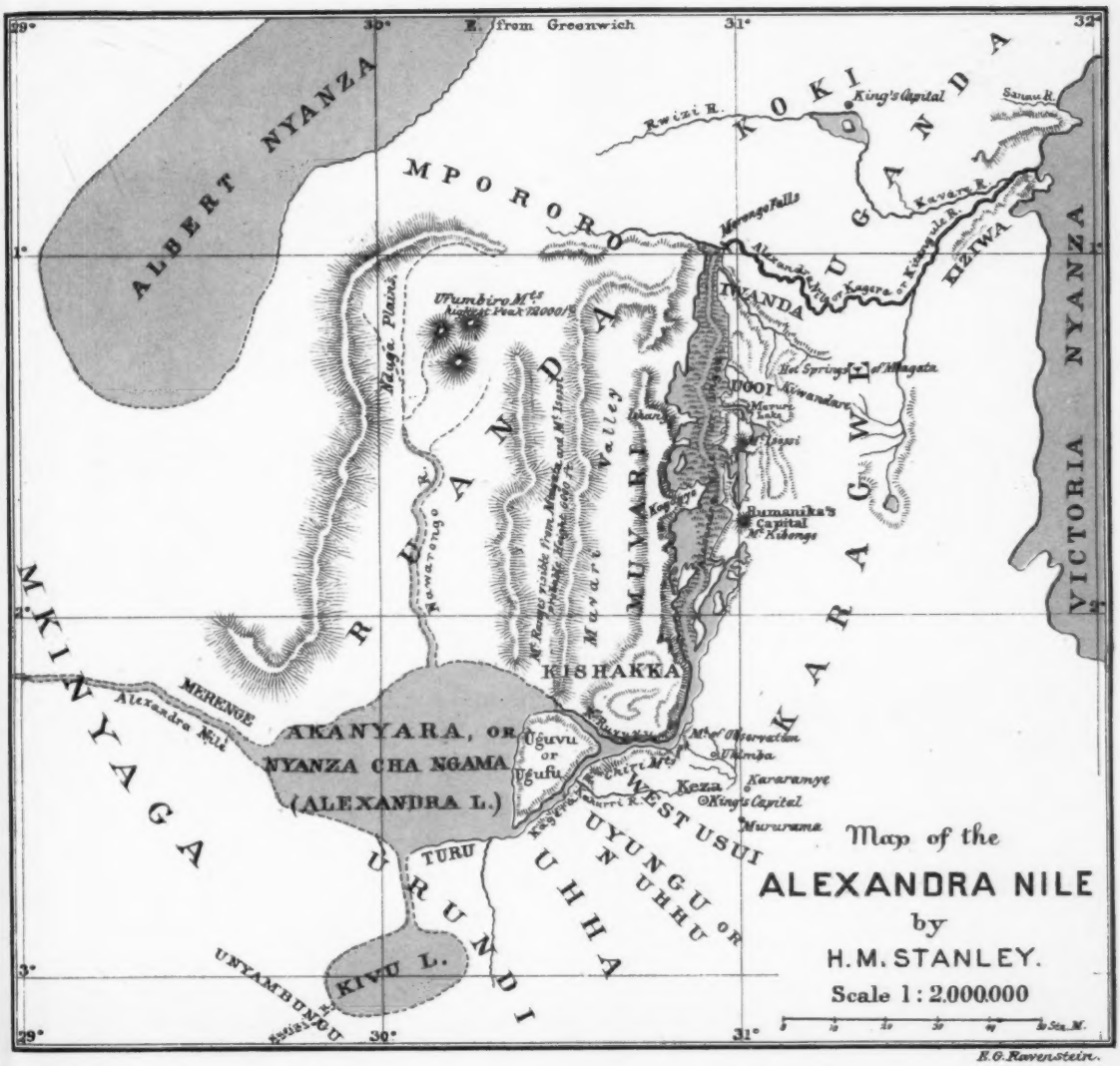
The late Sir Robert Schomburgk tells us that "Few countries on the surface of the globe can be compared with Guiana for vigour and luxuriance of vegetation. A constant summer prevails; and the fertility of the soil, the humid climate, and congenial temperature ensure a succession of flowers and fruits. The dense and almost impenetrable forest of the interior offers inexhaustible treasures, not only for ship-building and architecture in all its branches, but likewise for the manufacture of furniture, and for many other purposes, that minister to the restoration of health or to the comfort and luxury of man." The country is admirably watered by a multitude of rivers, and the climate does not appear unhealthy: from Mr. Brown's account, fevers, indeed, are common, but not of a very severe type. The time must come when the resources of this colony will be developed; in the meantime it forms a paradise for adventurers and naturalists. The wonder is that the charm it had for Waterton has not been communicated through the *Wanderings* to many more; few countries so fresh, present so few risks. The Indians are friendly and hospitable; and if the traveller can overcome his disgust to such pests as ticks and jiggers, he may easily avoid danger from larger enemies such as pumas, jaguars, and snakes.

Mr. Barrington Brown filled the office of Government Surveyor in British Guiana from 1868 to 1872, and in that capacity explored the colony in a very thorough manner, ascending or descending all the principal rivers, and traversing much of the country that lies between them. In four years and a quarter he made no less than nine distinct journeys, and he surveyed much of the country which had been very imperfectly laid down before, and some which was positively unexplored. His reports to the Government on the physical features and descriptive geology of the colony have already been published. In the present work he gives a pleasant account of his journeys, and the adventures he met with, together with much information on the habits of the Indian tribes, and observations on the zoology of the interior. These observations appear to us of special value, and it is clear that there is still in Guiana a wide field open for discovery. Much has yet to be observed and learned on the habits of the various *felidæ*, which are there comprehended under the general name of tiger, and it is possible that there are still fresh

* *Canoe and Camp Life in British Guiana*, by C. Barrington Brown, Assoc. R.S.M., late Government Surveyor in British Guiana. With maps and illustrations. (Stanford, 1877.)



H.G. Ravenstein.


29°
30°
E. from Greenwich
31°
32°
1°
2°
3°
ALBERT NYANZA
VICTORIA NYANZA
MPORORO
KOKI
UGANDA
Rwizi R.
King's Capital
Semuliki R.
Kavaron R.
Kagera or Kitangule R.
KIZIWA
Murchison Falls
Alexandra Nile or Kagera
RUANDA
Mfumbiro Mts
Virunga Peak 12000 ft.
Kaiga Plain
Mfumbiro Peak 16000 ft.
Mfumbiro Mts visible from Mwanza and Mt Usuri
Entebbe Height 4000 ft.
Mavari Valley
MUVARI
TWANDA
Hot Springs of Mangata
TOOI
Kiwandare
Maruru Lake
Mt Isozi
Kagera
Rumanika's Capital Mt Kidongo
KARAGWE
Nawarongo
MKINYAGA
Alexandra Nile
MERENGE
AKANYARA, OR
NYANZA CHA NGAMA
(ALEXANDRA L.)
KISHAKKA
Uguvu or Ugufu
Mt of Observation Uhimba
Mt Chire
Kagera R.
Kagera
Kagera R.
Keza
King's Capital
Kararanye
Mururama
WEST USUI
UYUNGU OR UNUHHU
UHHA
TURU
URUNDI
KIVU L.
UNYAMBUNDU
Mt Kisoke
Map of the
ALEXANDRA NILE
by
H. M. STANLEY.
Scale 1: 2.000.000
0
10
20
30
40
50 Stat. M.
E.G. Ravenstein.

species to be determined. Some of these creatures are said by the Indians to hunt in packs. Mr. Brown gives at pages 72-6 a humorous account of the alarm caused by Warracaba tigers, and the following account of the jaguars and peccaries is, we think, particularly curious :—

"On one occasion when we had landed, and were hunting a herd of bush hogs, two men were left in charge of the boat. We had not been away in the forest for more than two or three minutes, when the men in the boat heard a heavy foot-tread on the bank above them, and looking up saw a large jaguar gazing down on them from the very spot up which we had clambered. They immediately pushed the boat off into the stream for safety, fearing an attack from the tiger, as they had no gun to defend themselves with. They told me that this jaguar was what the Indians call the master of the flock of hogs we had been hunting; that it follows them wherever they go; and that when it is hungry, and finds a pig a little distance from the rest, it pounces upon it, killing it with one blow of its huge paw. The squeak of the stricken hog brings down the whole herd to the spot, whereupon the jaguar climbs a tree for safety till the storm it brewed is over and the pigs have left the spot, when it descends to feed on the flesh of its victim. I suppose when it has *cleaned out* an entire flock it seeks another one and proceeds as before.

"A story is told of an Indian who was following up a flock of hogs to get a shot, when he saw a jaguar knock over a member of it, as just described. When the flock bore down on the jaguar, it jumped upon a low fallen tree where it was surrounded immediately by the enraged hogs. Unfortunately for the jaguar it was not beyond their reach, and in a minute was dragged down amongst them, trampled on, and ripped to pieces.

"One can easily conceive how the number of bush hogs is kept down in this way by large tigers of various sorts preying upon them, but it is more difficult to understand what keeps the numbers of large tigers from increasing. They appear to have no enemies, nothing preys upon them, and the few killed by Indians would not affect their numbers in any sensible degree. Both animals increase at the same rate, the jaguars having from two or three cubs at a birth, and the peccary about the same number of young."

The Indians, who are fond of pets, succeed in taming some sorts of *tiger*.

Stinging rays were frequently seen on the sandy bottom, or grovelling for worms on the muddy banks under water. The wound caused by this creature's spine or sting is very serious. Mr. Brown's interpreter trod upon one and suffered agonies; for a week he was unable to put his foot to the ground, and the wound did not thoroughly heal for six weeks. Our author only once met with a sloth. We notice, with pleasure, that he is not one of those sportsmen who have such a thirst for blood that they must fire at every living creature which comes across their path. When not in want of fresh meat, he can watch a tapir in the water, and "it did him good to see the way in which it enjoyed its *tub*, diving in the deep water, and plunging and splashing in the shallow."

Mr. Brown comes across both of those useful plants which nature has provided to supply substitutes for both milk and water. The milk or cow tree *Tabernæmontana utilis*, "from an incision in the bark of which we obtained a good flow of thick, white, creamy sap, of a rich nutty flavour, but a little of it went a long way." And the vine, a portion of the stem of which, five feet long, produced at least a pint of pure, clear, cool water.

Want of space prevents our doing more than calling the readers attention to the strange and unaccountable noises in the mountains; to the highest waterfall in the world; and to the picturesque mountain region of Roraima with its flat top and lofty inaccessible cliffs of white, pink, and red sandstone.

THE CRADLE OF THE BLUE NILE. By *E. A. De Cosson.* 2 vols. Illustrations. (London, Murray, 1877).

MR. E. A. DE COSSON, a young officer in one of Her Majesty's regiments of Guards, has written a most readable book on a holiday trip through Egypt and Abyssinia. He may not be able to boast of having made geographical discoveries, or rectified existing maps, but he has seen much, and has described what he saw in an unexceptionable manner. In the course of his wanderings he paid a visit to King Yohannes, of Abyssina, whom he found encamped near Lake Tsana; he hunted the lion and the leopard; and has a great deal to tell us about Egyptian misgovernment and the slave trade. Of the Khedive's dominions he says :—

"Nature has indeed been lavish in her gifts to Egypt. Possessed of an inexhaustible river, and a glorious climate, her plains, were they but irrigated, might be rich with every kind of harvest, and her ports teeming with trade; but a fatal apathy seems to reign through the land, the Pashas are rapacious, their underlings indolent, the government wasteful in the extreme, the motto of the country 'Bukhara inshallah' (to-morrow, if it please Allah!)—to-morrow, *always* to-morrow, *never* to-day. What wonder, then, that instead of smiling in plenty, her peasantry are starving, and her very palm-trees growing under heavy taxation."

If Mr. de Cosson can be believed the slave-trade flourishes to-day as it has done for years past, and the bastinado is one of the most usual punishments meted out to those who give offence to the powers that be. The French Consul at Massaua—England is not represented in any of the Egyptian ports on the Red Sea—had a great deal to report about the manner in which that detestable traffic in human flesh is being carried on. His remonstrances on behalf of slaves, though exercised in accordance with edicts issued by the Khedive, are hardly ever attended to, and the despatches which he forwarded to his own government were intercepted by the Egyptian authorities. An Abyssinian who was sent to Prince Kassa of Tigre with despatches from the English Government, was summoned to the presence of Munzinger Pasha, on his return to Massaua, and on his refusing to relate what was the purport of the letters addressed by England to Prince Kassa, and also what the Prince had said in reply, was immediately given 200 blows with the bastinado. Can this be true; and if true, what reparation has England exacted from the Egyptian Government? At Galabat Mr. De Cosson found a slave-market flourishing, and an English merchant writes to him from Jiddah, that the Khedive's steamers continually bring slaves, "especially the pale and expensive ones," from Suakin and Massaua, the dealers paying a poll-tax to the Turkish Government. Many ships, we are told, which sail under the British flag, belong to Arab owners, and have the greater part of their crews composed of slaves. This was in 1875. At the time of the author's visit, the official representative of England at Jiddah was a Muhammadan, unable to speak English! Have matters mended since then? We believe not. The Egyptian Government is evidently unable or unwilling to suppress the slave-trade; even the Khedive's harem draws its supplies of human flesh from Massaua; nor will matters mend until properly qualified consular officers are sent to the principal ports of the Red Sea, together with a couple of gun-boats, to support them.

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PERU IN THE GUANO AGE, being a short account of a recent visit to the Guano deposits, by *A. J. Duffield.* (Bentley, 1877.)

MR. DUFFIELD gives some account of the guano deposits of the Peruvian coast after a recent visit. Peru, he says, has sold 20,000,000 tons of guano, at about 12*l.*

a ton, up to the present time, and the three famous Chincha Islands are now exhausted. The quantity of guano still remaining amounts to between 7 and 8,000,000 tons.

The new deposits are chiefly in the extreme south of the Republic, near the Bolivian frontier. The first is at the Pabellon de Pica, which was covered with nearly 50 feet of sand and stones. The principal slopes are now uncovered, and Mr. Duffield calculates the contents of the deposit at 1,000,000 tons. The upper crust of stones and sand had compressed the guano into so hard a mass that it had to be blasted with gunpowder before it could be conveyed by wooden shoots into the ship's launches underneath. The next series of deposits, about 8 miles farther south, is on a point called Punta de Lobos. Here there are 2,500,000 tons of good guano, all overlooking the sea. Still further south is Huanillos, with about 800,000 tons buried under huge boulders of rock; at Chipana, 6 miles south of Huanillos, there are also said to be 800,000 tons; and there are smaller deposits at Chomache, Islotas de Pajaros, Quebrada de Pica, and Patache. The whole quantity in these southern deposits is estimated at 6,000,000 tons of good guano. The principal labourers are Chinamen and Chilians, and at the time of Mr. Duffield's visit in 1876, there were no less than 300 ships waiting for cargoes.

In the north there is a large deposit on the island of Lobos de Afuera, in latitude 6° 57′ 20″ S., amounting to not less than 650,000 tons. The adjacent island of Lobos de Tierra contains more than 800,000 tons. There are a score of smaller deposits having in all 115,900 tons; which makes 1,565,900 tons on the northern coast. So that the total quantity remaining to Peru is 6,565,900 tons, but, according to Mr. Duffield, 7,500,000 tons. That reporter hints that he has detected indications of other large deposits on the southern shore, but he intends to keep them to himself for a more convenient season.

In our number for December 1874 (p. 370) we had an article describing "The New Guano Deposits of Peru," and, quoting a report of two civil engineers, which estimated the quantity of guano in the southern deposits alone at 7,400,000 tons, exclusive of that on the northern coast. But it seems probable that Mr. Duffield's more moderate estimate is nearer the truth.

As regards the nitrate of soda in the province of Tarapaca, Mr. Duffield says that 1,508,000 cwts. were sold in 1863, and 5,830,000 in 1873. The region of nitrate is a barren plain, 3000 feet above the sea, containing 150 square miles of land, which will yield at least 70,000,000 tons of nitrate, selling at 12*l.* a ton. Fuller information respecting the nitrate of soda trade will be found in our numbers for December, 1873, p. 385, December, 1874, p. 370, and April, 1876, p. 90.

Mr. Duffield's book consists of 151 pages. The accounts of the guano deposits and of the nitrate works are comprised in 50, from pp. 71 to 120. The rest will scarcely repay perusal, if we except the extracts from Colonel Espinosa's really admirable *Diccionario Republicano*, which, however, should be read in the original to be properly appreciated.

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NARRATIVE OF THE DISCOVERY OF THE GREAT CENTRAL LAKES OF AFRICA. By *J. L. Clifford Smith.* (Halifax, 1877.)

IN a small pamphlet of 32 pages, the author tells the story of the recent discovery and exploration of the four principal lakes of Central Africa. In his company we follow in the footsteps of Burton, Speke, Grant, Baker, and Stanley, and we are made to rejoice in the rapidity with which so large and interesting a portion of Central Africa has been revealed to us in the course of twenty years. The narrative has been carefully compiled and is well written. The author holds that the existence of these lakes was known to the ancients and the Portuguese during the middle ages, and Mr. Major has shown that there are some grounds for this opinion; but the subject is one too comprehensive to be dealt with on the present occasion.

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GESCHICHTE DES ZEITALTERS. Der *Entdeckungen von Oscar Peschel.* 2te Auflage. (Stuttgart, London, Siegle.)

IN Oscar Peschel, Germany has lost one of her foremost geographers, prominent alike for his learning as for the finished style in which he placed the results of his researches before the public. This "History of the Age of Discoveries," is certainly the most popular work written by him, and we feel indebted to the publishers for providing us with a second edition of so valuable and interesting a work. The author describes the great voyages of Portuguese and Spaniards, from the time of Henry the Navigator, to that of Vasca da Gama, Columbus and Magalhaes. He shows the influence which these discoveries had upon thought in Europe, and throughout treats his subject in a philosophical spirit. The book is well written and printed in legible Latin type, and should certainly not be neglected by those who deal with the history of geography.

Cartography.

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OFFICIAL EUROPEAN CARTOGRAPHY IN 1875-76.

(Continued from page 106 of our last number.)

IN FRANCE geographical activity has been incessant since the termination of the war. The large map on a scale of 1:80,000, in 267 sheets, has been completed, with the exception of seven sheets. In the course of 1876, sheets 179, 213, and 225 were published; and we are thus in possession of a map of the whole of continental France, on a uniform scale, and executed in a style of superior excellence. Of the seven sheets of Corsica four are in the hands of the engravers.* The cheap edition of this map, which is sold at the small price of 1*cd.* a sheet, has likewise been published, with the exception of sheet 168 (Lyons), which is undergoing correction. A similar edition of our own expensive one-inch map might recommend itself, if it were only for the sake of protecting the public against certain pretended "reductions" of the ordnance survey, which are being hawked about by "enterprising" publishers. The same map has been utilised in the production of maps of arrondisements. Of the smaller map of France (scale 1:320,000) thirty-one sheets out of a total of thirty-three have now been published, with the hills, and the remaining two (37 Avignon, 33 Corsica) in outline only.

Amongst the work now in progress is a magnificent map of the French Alps, of which eighteen sheets, out of a total of seventy-two, have already been published. The map will embrace the whole of the territory between the meridians of Toulon and Turin, and between the Col de la Seigne, near Courmayeur, to the Col de Tende in the south. The scale is the same as that of the Carte de France (1:80,000), but the hydrographical features are printed in blue, and the hills delineated by brown equi-distant contours. The Dépôt de la Guerre has likewise published, since 1875, a map of the Department of the Seine in twenty sheets, on a scale of 1:20,000, and the Dépôt des Fortifications is issuing a Map of France in fifteen sheets, and on a scale of 1:500,000. This latter is being published in two editions,

* Viz., sheets 161, 263, 265, and 267. Sheets 262, 264, and 266 have not yet been begun.

the one in outline, as a road map, the other with hills. A copy of this fine map, tinted according to height, was exhibited during the geographical congress at Paris, and attracted general attention. No progress appears to have been made recently with the geological Map of France (1:80,000). As far as we know, twelve sheets of this map have now been published* besides reference sheets and geological sections.

In ITALY considerable progress has been made with the Map of Southern Italy, on a scale of 1:50,000. This map embraces the whole of the old Kingdom of Naples, and will be completed in 180 sheets. The original surveys for this map are made on a scale of 1:20,000 or 1:25,000, the features of the ground being shown by contours. The published maps are produced by photography (Albert's heliographic process) or by Colonel Avet's process of heliogravure. The 122 sheets published embrace the whole of Sicily, Calabria, Basilicata, Foggia, Avellina, Salerno, and portions of adjoining provinces.† Amongst other recent publications a topographical map of the environs of Florence is deserving special attention as a triumph of cartographic delineation. The contours, at intervals of ten metres, are printed in a delicate red, the hills are tinted grey, and the execution is most creditable to Herr Müllhaupt, of Bern.‡ The military authorities have likewise published a road map of the whole of Italy, in six sheets, on a scale of 1:1,000,000.

In SPAIN a beginning has at length been made with the publication of a Topographical Map on a scale of 1:50,000. The Trigonometrical Survey, under the direction of General Ibanez, has been in progress since 1858, or earlier, and its results, thus far, have been published in a volume of *Memorias de Instituto Geografica y Estadistica* (Madrid, 1875). Each sheet of the map will embrace an area 20 min. of longitude in width and 10 min. of latitude in height. The ground will be shown by contours laid down at intervals of 10 or 20 metres. Two sheets (Madrid and Colmenar viejo) were published in 1875, and as the number of sheets will be very large, many years must necessarily pass before Coelho's valuable map of Spain can be superseded by a more perfect work. The "Comision de la mapa geológico de España" likewise published *Memorias* and a *Boletin*, but the progress made is very slow.

Of the Topographical Map of PORTUGAL (1:100,000), thirty-seven sheets have been published since 1856, under the superintendence of General Folque, of the corps of Military Engineers. The hills, on the first sheets, were shown by hachures, but subsequently the more expeditious method of contours (drawn at intervals of 25 metres) has been adopted. For general purposes the map on a scale 1:500,000, though by no means very distinct, will be found sufficient. It was published in 1871.

GREECE contents herself with the survey made by French Engineers in 1829-32, whilst TURKEY has not hitherto produced a single map based upon scientific principles. The Turkish maps exhibited two years ago at Paris, though found by a too-accommodating jury, deserving of prize-medals, were in reality very uncouth productions.

One of these specimens of native workmanship, a map of the Sanjak of Filibe, has recently been transcribed by Dr. H. Kiepert, and published in the *Zeitschrift* of the Berlin Geographical Society (1876). The most valuable contribution to the cartography of European Turkey has been made by the Austrian Military Geographical Institute. It consists of a map§ of the north-western portion of the Balkan Peninsula, bounded by the latitude 42° N. and longitude 22° 30' E. of Greenwich, and is based upon surveys by Austrian officers. The hills are drawn in chalk, the forests tinted green, and there are numerous altitudes. This map will be extended eastward, so as to embrace the whole of Bulgaria and the Danubian Principalities. Kanitz's map of Bulgaria, promised long ago, has not yet been published, though a prize was awarded for it at the Paris Exhibition, where it was *not* exhibited. The lower Danube has been delineated with much detail on a map prepared for the European Commission.*

M. Massaloup has published a general map of Romania,† which is interesting, not so much on account of its topography, but because it presents us with what we suppose to be the official nomenclature introduced since the substitution of the Latin for the Russian alphabet. Of Scheda's general map of Turkey and Greece a new edition has been published, as also of Handtke's large map, but neither of these can compare in general accuracy with Kiepert's well-known map published in 1871. Colonel Artamanof's Map of Turkey in Europe (scale, 1:420,000) has been published recently at Vienna (?), but we have not yet seen a copy of it. It ought to embody a great deal of valuable information collected by Russian officers, and not hitherto available.

In conclusion, a few words may be said with respect to maps embracing larger portions of Europe. The enlarged edition of Colonel Scheda's‡ map of Central Europe was completed last year. Liebenow's§ map on the same scale, which proved of such great service during the Franco-German war, is making slow progress, but of Reymann's excellent map, no new sheets appear to have been issued recently, though a new edition is in progress of publication.‖

Log Book.

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The Royal Awards of the Geographical Society for 1877.—The Council has awarded the Founders' Gold Medal to Captain Sir George Nares, K.C.B., F.R.G.S., as Commander of the Arctic Expedition, which so successfully, and in the face of such unparalleled difficulties, completed that portion of the exploration of the North Polar area which was accessible by the Smith Sound route. The Council has also awarded a Gold Watch, with an appropriate inscription, to Captain Markham, R.N., F.R.G.S., as Commander of the northern division of sledges, and for having reached the highest latitude ever attained by man. Captain Markham was the senior officer of the commanders of sledge exploring parties, whose admirable work is thus recognised by the Council. The Patron's Gold Medal has been awarded to Pundit Nain Sing, an account of whose discoveries on the plateau of Tibet will be found in our number for June 1876, p. 145.

* Sheets 31, 32, 33, 47, 48, 49, 64, 65, 66, 79, 80, and 81.

† Corpo di Stato maggiore:—Carta delle provincie meridionale del regno d'Italia:—sheets 22-25, 29-32, 37-40, 45-48, 54-57, 60, 63-67, 73-78, 82-87, 92-96, 99, 174, 106 bis, 109 bis, and 128 bis.

‡ Istituto topografico militare:—Carte topografico dei dintorni di Firenze. 1:25,000. Nine sheets. Florence, 1876.

§ K. K. Military Geographical Institution: Generalkarte von Serbien, Bosnien, Hercegowina and Montenegro. 1:300,000. 12 sheets. Vienna, 1876.

* R. Hansford et Ch. Kuhe, Carte du Danube et de ses embranchements entre Braïla et la mer. Levée en 1870-71 sous la direction de Sir Charles Hartley. 7 sheets. 1:73,000. Leipzig, 1875.

† Romania, compusa de I. V. Massaloup. 1:866,400. Bucuresci, 1875.

‡ Scheda, Generalkarte von Central Europa (in Heliogravure). 1:300,000. 192 sheets at 1s.

§ Liebenow: Specialkarte von Mittel-Europa, 1:300,000, in 164 sheets, of which sheets 1-42, 47, 55, 60, 67-69, 74, 81-83, 88-91, 95-97, 102-105, 109-111, 116-119, 123-133, 137-139, 142-143, 151-153, 156-158 have been published.

‖ Reymann's Specialkarte von Deutschland, &c. 1:000,000. 461 sheets at 1s. singly, or 9d. to subscribers. 336 sheets have been published.

The Dutch Polar Expedition.—Last March there was a large meeting in Holland, under the patronage of Prince Henry, to consider the propriety of fitting out an Arctic Expedition. Commodore Jansen opened the meeting with a speech, referring to a proposal by Herr de Yonge that monuments should be erected in various parts of the Arctic Regions, to perpetuate the memory of former Dutch discoveries. He also declared that the appeal of Lieutenant Koolemans Beynen had found an echo in the hearts of the people, and announced that H.R.H. Prince Henry had expressed his willingness to place himself at the head of this national undertaking. Commodore Jansen then requested Herr de Yonge to give a historical sketch illustrating his plan, and Lieutenant Beynen to submit a scheme of the proposed voyage, and an estimate of its probable cost. Finally he suggested the formation of a central and of local committees to consider the means of carrying out the proposal.

Herr de Yonge then gave a historical account of Dutch Arctic discoveries, and said that it was a sad truth that the old Dutch names were disappearing from the charts, and that modern foreign names were gradually taking their places. When the Circular of February 18th, 1877, was prepared by Commodore Jansen, Herr F. D. Frausen, Herr van de Putte, O Baron von Wassenaer Catwijck, and Lieutenant Beynen, they did not only think of the traditions of the past, but also of upholding the name of Holland in the eyes of Europe. They thought that, as the minds of other nations were now turned to the north, the Dutch should also undertake such voyages, both in vindication of their own self-respect, and for the good of their navy. Herr de Yonge named the following places as localities where monuments might appropriately be erected—Jan Mayen Island, Spitzbergen, Bear Island, Orange Island, and the Winter Harbour of Barents. A short discussion took place as to whether the English or Dutch had first discovered Jan Mayen Island, and the President decided that it was first seen by the English, but first landed on by the Dutch. Lieutenant Beynen then stated the best season for sailing and for visiting the different points, and recommended the use of a small steamer. He also entered upon details respecting the outfit, the provisioning, and the pay of the crew. It was finally agreed that a Central Committee should be named. The practical use of this first cruise will be that if, hereafter, it is decided that international scientific stations shall be established in the Arctic Regions, the Dutch will not be without experience, and will be in a position to take their rightful place in the work.

Wrangell Land.—Impropriety of changing names given by Discoverers.—In our number for October 1876 (p. 263), we gave an abstract of the pamphlet by Herr L. von Helmersen, showing the impropriety of Dr. Petermann's proposal to change the name of Wrangell Land, the name indicated by Captain Kellett and given by its actual discoverer Captain Long, to Kellett Land. The facts of the case have since been thus briefly stated by Baron von Wrangell's son. "Captain Long discovers a land, makes use of the right of every discoverer, and gives it the name of an Arctic explorer, who was prevented, by insurmountable difficulties from reaching this land, in the existence of which he had such strong reasons to believe that he traced it on his chart as highly probable: and from his chart it was copied into every other chart as probable land, until actually discovered by Long." This explorer was Wrangell. Long, as the discoverer, had a perfect right to name it, and Dr. Petermann certainly has no right whatever to alter the name when once given. It appears that Dr. Petermann endeavoured to show that Wrangell himself denied the existence of this land, by making two quotations from his work. His first quotation is to the effect that land alleged to have been discovered north of the Kolyma by Andeyef (see our number for October, 1876, p. 264) has no existence. But if Dr. Petermann had continued his quotation it would have been seen that in the very same page Baron von Wrangell says that the existence of an unknown land north of Cape Jakan, at a distance of 530 versts from the Kolyma, is probable. In his second quotation Dr. Petermann is equally unhappy. He says that Baron von Wrangell closes his report with the words "that in every attainable distance from the Asiatic shore there does not exist any land." But the report does not close with these words. Wrangell goes on to say that if there exists land in the north, in a region which he could not reach, its discovery ought to be undertaken straight from Cape Jakan, since it is there that, according to the inhabitants, the looked-for land approaches nearest to the main land. Both quotations when read to the end, prove the exact opposite of what Dr. Petermann intended his reader to believe, namely, that Wrangell never denied the existence of the land discovered by Long, and called by him Wrangell Land.

But all this is beside the question; which is, whether names given by discoverers are to be altered by any map maker who sees fit to question their propriety? We earnestly protest against such a proceeding as infringing on the acknowledged rights of discoverers, and as tending to every kind of confusion.

When Captain Kellett saw an extensive land between 70° 45′ and 71° 30′ N., (long. 178° to 178° 30′ W.), he concluded that it was the continuation of the mountains which, according to von Wrangell, are sometimes seen from Cape Jakan. He did not give it a definite name, but called it the continuation of Wrangell's Land. Long, who approached it so near as to leave no doubt whatever about its existence, made use of his indisputable right, and called it by the name which Kellett had indicated—Wrangell Land. We cordially concur in the view expressed in von Helmersen's concluding sentence—"It was through Baron Wrangell's work that trustworthy news respecting this land first reached the civilised world, and we think it only fair that it should for ever retain the name given to it by its discoverer Captain Long."

Turkey.—The Austrian Consul Sax, at Adrianople, furnishes some interesting information on the population of some of the towns of ancient Thrace. Constantinople he estimates to have a population of about 615,000 souls, viz., 290,000 in Stambul, 250,000 in Pera, Galata, and other European suburbs, and 75,000 in Scutari and the Asiatic suburbs. About 58 or 60 per cent. of the inhabitants are Turks, the remainder Greeks, Armenians, Jews, Franks, &c. In the Vilayet Edirne (Adrianople) there are twelve towns of over 10,000 inhabitants, viz., *Adrianople*, 60 to 62,000—say 22,000 Turks, 15,000 Greeks, 12,000 Bulgarians, and the remainder Spanish Jews, Arme-

nians, gipsies and Franks; *Philippople* (Filibe), 28,000 inhabitants, of whom about one-half are Bulgarians, one-fourth Turks, one-sixth Greeks. *Eski Zadra*, 24,000 inhabitants, of whom two-thirds are Bulgarians, and the remainder Turks, gipsies, and Jews. *Sliven* (Islemief) 21 to 29,000 inhabitants, in the same proportions as in the preceding. *Sofia*, 18,000 inhabitants, of whom 6,000 are Turks, 6,000 Bulgarians, 4 or 5,000 Jews, and the rest gipsies and Armenians. *Rodosto* (Tekfur Daghij), 17,000 inhabitants, of whom more than half are Greeks, one-third Turks, and the remainder Bulgarians, Armenians, Jews, and gipsies. *Kirk Kilisse*, 16,000 inhabitants, of whom two-thirds are Bulgarians, one-fifth Turks, and as many Greeks. *Bazarjik*, 15,000 inhabitants, of whom more than half are Bulgarians and one-third Turks. *Kezanlyk*, 13 or 14,000 inhabitants, of whom nearly two-thirds are Bulgarians and the remainder Turks. *Khaskoi*, 12 or 13,000 inhabitants, more than one half of whom are Bulgarians. *Chirpan*, 12,000 inhabitants, including 8000 Bulgarians and 4000 Turks. *Samakof*, 12,000 inhabitants, mostly Bulgarians and Turks. *Yamboly*, *Gallipoli*, *Gomuljina*, and *Kostendil* have about 10,000 inhabitants each; the Bulgarians predominating in Yamboly, the Greeks in Gallipoli, and the Turks in Gomuljina. Demotika, Chorlu Dubritza, and Mustafa Pasha Koprissy (including Chirmen) have about 8000 inhabitants each; Karinabad, Akhyoli, Lule Burgas, Malgara, Keshan, and Sharkoi (Peristeri) about 5000 each. In all these towns, with the exception of Dimotika, the Christians predominate. The Turks, do not, in fact form a majority in any large town, Gomuljina and Dimotika alone excepted. They predominate, however, in a number of smaller places, such as Burgas, Uzunkopry, Ferre (Ferejik), Khaireboly, Viza and others. Mastanly in the Rhodope is exclusively inhabited by Muhammadans, and Samakovo in the Stranja by Christians. The above statements are derived from the official annuals, published in the capitals of the vilayets, which give the number of houses and of male inhabitants (*Mittheilungen of the Vienna Geographical Society*, vol. xx., p. 126).

Colonel Prejevalsky in Central Asia.—The latest news from Colonel Prejevalsky was received at St. Petersburg by way of Vernoe on the 11th March last. The telegram referred to was to the following effect:—"On the 30th January, having left Kurla on Lake Lob-Nor, I crossed the lower Tarim. The valley of the river is but thinly populated; its height is rather more than 2000 feet, the fauna and flora are both very poor, and the topography of the country is quite different from what it is shown to be on the best maps. I am now in the Altyn-Tag Mountains, a little south of Lake Lob-Nor. Some of the valleys rose to the height of 11,000 feet. Here, and lower down, wild camels are to be seen; I hunt these animals which are very shy. Near Lob-Nor I have seen the ruins of two ancient towns. I shall pass February and March on Lake Lob; April on the Lower Tarim; May and June on the Tian-Shan, and in the first days of July I shall return to Kulja. The scientific labours of the expedition are progressing with success: all my companions are in good health and full of zeal."

Ethnology of Russia in Europe.—A most interesting paper on the nations inhabiting European Russia has been published in Petermann's *Mittheilungen*, 1877, Parts I. and IV. It is accompanied by an elaborate ethnological map of the whole of the Russian Empire, based upon the labours of Rittich and Veniukof, and contains a great deal of historical and statistical information. The numerical distribution of the various races is given for each government. We confine ourselves to the following summary.

Russians (Great, 34,389,871; Little, 14,193,663; White, 3,592,057)	52,175,593
Other Slavs (4,764,713 Poles; 93,685 Bulgarians; 7790 Chechians; 7614 Servians)	4,833,802
Lithuanian (811,051 Lithuanians; 623,700 Shmudes; 1,047,929 Letts)	2,482,680
Germanic (983,471 Germans; 273,021 Swedes; 188 English)	1,256,680
Greco-Latin (648,464 Romanians, 77,132 Greeks; 1036 French)	726,632
Iranian (34,200 Armenians; 111,654 Gipsies)	145,854
Semitic (Jews)	2,552,145
Caucasians (617 Andyge; 181 Georgians) ...	798
Samoyeds	5370
Ugrians (Voguls)	2031
Volga Fins (791,954 Mordvins; 259,745 Cheremis)	1,051,699
Permians (240,490 Votyaks; 67,315 Permians; 85,432 Syrgani)	393,237
Fins (2,013,551 Kareli; 48,028 Chudes; 746,522 Esthonians; 2541 Livonians; 7497 Laps)	2,818,139
Tatars (1,212,610 Tatars; 15,585 Nogai; 156,462 Kirgiz; 2162 Karakalpaks; 1781 Turkmen)	1,488,600
Tatarised Fins (755,868 Bashkirs; 1443 Besermians; 136,463 Meshcheryaks; 126,023 Teptiars; 569,894 Chuvash)	1,589,691
Mongols (Calmucks)	107,531
	71,470,482

In Asiatic Russia there are 4,120,688 Russians and 26,762 (?) Poles.

Peru.—Professor Charles Wiener, now travelling in Peru, complains much about the insufficiency of the maps of that country. Raimondi's map of Ancachs he calls a "mere imaginary topographical delineation," though not without value in some respects. The distances between the different towns as given on route maps cannot be trusted. Mile-stones have been erected along the principal roads, but the distances between them cannot be trusted. The Peruvians have very vague notions as regards a mile. The official legua is 4·237 kilometres. Professor Wiener carefully measured the distance between two mile-stones, and found that it amounted to 5·857 kilometres. As government pay their couriers at so much a legua, they appear to be interested in placing these stones as far apart as possible. There are "leguas largas," "de gobierno," and "de posta." The distance from Cajarmarca to Cuzco is usually assumed to amount to 450 leguas, though officially it is only 350.

Baron von Richthofen's new work on China.—The first volume of Baron von Richthofen's elaborate work on China was announced some time since, and has been in print for about three months. But it was found advisable to delay the publication, for the purpose of adding explanatory maps to illustrate the historical geography which forms the chief part of its contents. The volume is now on the point of being issued, and may anticipate this notice.

Correspondence.

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TRANS-HIMALAYAN MISSIONS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—An article appeared in the *Calcutta Review* for January last, on "Trans-Himálayan Missions and their Results." Its aim is to bring about the abandonment of enquiry in that direction, and to put a stop to the progress which is being made towards the establishment of commercial intercourse with the neighbouring countries along our Indian frontier. This, too, at a time when the almost utter ignorance which prevailed in every quarter, more especially the highest, is being enlightened and instructed, by information of the most valuable character in every respect—political, military, commercial, religious, and scientific, indeed, in all that relates to human interests. And not only so, for at the present moment there are some hopes that through Sir Thomas Wade's intervention at the Court of Peking, the political obstructions to European intercourse along the Indo-Chinese frontier, which have hitherto been strictly maintained, and repeatedly found to be inviolable, are at length brought under diplomatic consideration with a fair prospect of ultimate removal. All this, and more, of which notice will be taken hereafter, our Reviewer would absolutely abandon, and revert to the former state of blank and chaotic darkness and stolid indifference.

This writer, at the seat of the Indian Government in Calcutta, endeavours to enforce his opinion, with elaborate arguments based on superficial if abundant learning, that there is no wealth in Trans-Himálayan countries, that Warren Hastings was mistaken in expecting to find any, and that the recent revival of the first Governor-General's sagacious efforts, are repetitions of that mistake.

No doubt the efforts of the Indian Government have not hitherto been attended with much commercial success, for the beginning was made at the wrong end. So far the attempt to open up trade has consisted in endeavouring to sell our own articles to the people beyond our frontiers—a peddling procedure, from which nothing of any magnitude could be reasonably expected. The disappointment already arising is declared in the unwise reaction which the Reviewer has undertaken to promote. His elaborate research displays no insight; and I would urge that there should be a fresh start on a more rational basis, at once simple and aiming at great national ends.

It is well known that Tibet with Mongolia beyond, together with the former Chinese province of Ili, which for the present is independent, constitute one vast pastoral region, abounding in flocks and herds from time immemorial. We say nothing of its extensive goldfields and precious stones, its borax and other products. These may be left to secondary operations. But for wool there is an unbounded demand, it is the original staple of our national wealth and manufacturing industry. Its importance in English eyes is typified in its being used as the official seat of the highest functionary of the realm, second only to the prehistoric boulder of Scone, which forms the unique throne of our sovereign, and is considered by the learned to carry with it imperial destinies.

It is not only the quantity of the wool in the regions along our Indian frontier, but also its unequalled quality that invites our attention. For in these elevated pastures the sheep produces a fleece of a most valuable and peculiar description, affording the animal an extra protection against the inclemency of the loftiest regions in the world.

But the Reviewer asserts that this Tibetan wool cannot be brought into the market on account of the cost of carriage. How does he know? Have any enquiries been made among the flock owners of Tibet on the subject? It is not a question that can be answered by our own or Australian experience, although in Australia it must be remembered that the wool has for the most part to be carted from great distances to the ports.

In Tibet there is this remarkable circumstance to be taken into account, the sheep is in that country a beast of burden, carrying loads usually of 32 lbs. weight; and a flock of 1200 laden sheep can be conducted over mountain paths by half a dozen native shepherds. Captain J. Biddulph made a small experiment on travelling with laden sheep, which is narrated in the *Report of Sir T. Douglas Forsyth's Mission to Yarkand, in* 1873;" and there is abundant evidence besides of a more practical character. Furthermore, it is only requisite to reach certain points along the whole range of the Himálaya, to find rivers capable of conveying the produce for the rest of the way to the port, and in time the railways may be expected to compete for the trade.

The pastoral arrangements necessary for the periodical passage of flocks and herds, are quite familiar to the chiefs, flock owners, and people of the Himálaya and Tibet. In the mountainous parts of the Punjab, our own officials have already acquired some experience of this kind, and all that can be requisite must be capable of suitable adjustment. The subject is of great importance in the present case, as it bears on the question of the carriage of the wool to points in or near the plains, which afford facilities of land and water conveyance. It is one to be devised and worked out in the first place with the flock-owners; and then, if necessary, the aid of government may be invoked. I would deprecate such ideas on this point as led to the construction of the unfinished Dalhousie Himálayan Road, or any other schemes involving extravagant outlay. Our young enterprise must not be weighed down by costly refinements. Economy depends on adhering, at first, to the customary expedients of the natives.

We say, then, confidently, that commerce with the pastoral regions that stretch for two thousand miles along our Indian frontier, is to be opened up, not by the peddling course so far pursued, but by entering the country as buyers to any extent, within limits of price and conditions of delivery at certain points where ordinary land and water carriage would have to be employed. The flock-owners thus enriched, would naturally become our customers for manufactures, including even the fabrics for which they have supplied the raw material.

This is the effectual way to establish not only a profitable commerce of importance to our manufacturing industries, all along our Indian frontier, but also peaceful relations with the respective governments, and an extension of our influence throughout Asia, commensurate with our capital and commercial resources.

No one can estimate the development which such a trade, when once started, might undergo. The prospect points to a double series of diplomatic operations tending to Europeanize the Asiatic continent. The first would be a series of Boundary Treaties to appease territorial apprehensions, the second would be Commercial Treaties to regulate the traffic.

Before I conclude, allow me to point out the alternative. While the Calcutta Reviewer is advocating the cessation of Himálayan Missions and Himálayan Exploration, our friends the Russians are pushing their expeditions through all parts of Mongolia, and have already reached the confines of Tibet. In the interests of their favoured manufactories, the Russians are not likely to be indifferent to the raw materials of Mongolia and Tibet, or to the return trade which their purchase must beget.

But the inferior capabilities of the Russian manufactories cannot secure for them a market, unless it be protected from competition. Hence territorial aggrandizement becomes necessary to the extension of Russian commerce and the support of her exclusive system.

The Government of Peking is thus compelled to look upon the Russian trade in the Chinese dominions as a threat of territorial aggression. With a characteristic sagacity which may be commended to the serious study of our Calcutta Reviewer, not to speak of others in more responsible positions, Russia has perceived the key to popular influence throughout Northern Mongolia; a key, too, which finds responsive strings and chords over the whole of the wide region, which is subject to the spiritual domination of the Lamas, and which, through that superstitious influence, could be roused into a religious or political excitement at any moment.

It is Urga to which we allude, the seat of the Taranath Lama, or Patriarch of the Mongolian Hierarchy. The power of this high priest and his subordinates is so well understood by the Chinese Government, that his appointment or selection has been removed as far as possible from the influence of the Kalka Princes, among whom he resides, and made directly dependant on the Grand Lama of Tibet. Still it must be obvious that the Taranath remains the centre of an organisation capable of exciting a dangerous population; and, as such, the Russians have not only succeeded in establishing a political agency at Urga, but they have made good their claim to support it by an armed force.* Meanwhile our Calcutta officials find it difficult to understand what the name of Kalka or Karka means. Starting with the assumption that it referred to some unknown town, they cannot divest their minds of that idea, and wilfully resist the true explanation, which is by no means a secret to less pretentious students of Central Asia. The Kalka is a river of Outer Mongolia, on which the princes of the Mongol dynasty settled when they were expelled from the throne of China. Hence their descendants are now known as the Kalkas or Karkas, and they hold the four Kalka Khanates, named Tuchetu, Sannoin, Zassactu, and Tsetsen, which together constitute the Chinese Colonial Government of Outer Mongolia. Once rulers of the Chinese Empire, the Kalkas must continue to be deserving of the watchful attention of the Chinese Government; and it was to counteract their influence that the selection of the Taranath Lama was taken from them, and entrusted to the authorities at Lhasa.

This state of things must command attention, if the natural resources of the Tibetan frontier are to become the objects of our commerce. The proximity of Lhasa to India, not to speak of the deep attractions which intercourse with India presents to all sincere followers of Buddha, would then obviously become an immense political advantage to those in power in India who are sensible of its use. Among the numerous scattered families, who pass from pasture to pasture with the regularity of the seasons, the Lamas, in their religious circuits, become the means of communication and intercourse, and it is clearly of the first importance to stand well with that priestly class, through the hierarchy which governs them. In Lhasa—a place at no great distance from the Indian frontier, and by no means difficult of access, if political obstructions were withdrawn—is the sacred centre of that hierarchical authority to which even the Taranath of Urga is subservient. We should have, thus, in the possession of influence at Lhasa, a direct counterpoise against Russian influence at Urga, not merely outweighing it, but capable of subverting it altogether.

All our precedents are highly in favour of a satisfactory issue to serious efforts perseveringly made to establish intercourse with Lhasa. To the Chinese paramount Government we can honestly unfold our views as having none other than a commercial character, inasmuch as we require nothing more than an open market, and are well content to leave to them the burden of administration as well as the improved revenues and official advancement consequent on prosperous trade. While Russian trade threatens China with nothing less than total territorial absorption, British trade is certain to promote the national wealth, the prosperity of the people, and the security of a government amenable to progress. Consequent on prosperous trade with the native Tibetan, we need not apprehend any real difficulty. The Chinese, we know, are keen and unscrupulous competitors, with a tendency to exclusiveness, which however is not insurmountable, but we have nothing to guard against from them in the way of territorial aggression. It is far different with the Russians. Commercially exclusive, territorially aggressive, and swayed by unlimited military ambition, it is impossible to conceive of a more dangerous neighbour than the Russian, or one with whom it would be more difficult to remain at peace. A Russian occupation of Mongolia and Tibet would not only be a death blow to our commercial expectations in those quarters, but it would also give occasion for very serious general anxiety. Let it be remembered that those regions have, in former times, been the birth-place of devastating irruptions which have overrun the old world from east to west. China, South-Eastern Asia, India, Persia, Turkey, and Russia itself, have been subdued by the hardy shepherds of these pastoral and sparsely-peopled tracts, whenever a great leader has arisen among them.

The people are as hardy and warlike as ever. Their traditions render them keenly alive to the attractions of conquest. Under the military organisation of Russia, they would be fitted to compete with modern armies, and with such a recruiting ground the power of Russia would be immeasurably increased.

What a contrast to the realisation of pastoral prosperity and contentment which would follow from the inauguration of British enterprise in this great Land of Wool. Wealth would pour in; the safety of life and property would become a necessity; and the increase of population is the obvious result. But instead of pouring forth in devastating hordes upon the unoffending populations around, their surplus hands would pass off as peaceable emigrants to replenish other parts of the earth. Is it consistent with modern statesmanship to look so far ahead, or is the *Calcutta Review* its exponent?

T. S.

* Professor Wassiljew's Russian account of the Taranath Lamas, and the doctrinal work of one of them, together with the translation into German by Prof. Schiefner, has been noticed by Mr. Markham in his Introduction to *Bogle's Journey to Tibet*. The Government of India, as one alive and sensible to Asiatic politics, should have this work translated into English.

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AMU-DARYA EXPLORATION.

To *the Editor of the* "GEOGRAPHICAL MAGAZINE."

SIR,—I was not a little surprised on examining the map of the Upper Amú, based upon observations of the Russian exploring party of 1875, which was published in your number for December 1876. On this map I find 300 feet given for the elevation of the bank of the river, in (about) long. 65° 45′; a figure that *must* be erroneous, if it be remembered that the height of Toyonboyin, some hundreds of miles further down the stream, was found by *spirit-levelling*, in 1874, to be 365 feet above mean sea level.

The height 300 is much more likely to be 1300 feet; since Burnes (I believe) stated Balkh to have an elevation of 1800 feet, and to be situated on ground which sloped gently down to the Oxus. The figures I have suggested, would, I may remark, be also in consonance with the height given by the Russians for Karshi, viz., 820 feet.

Those who follow the development of steam-navigation on the Amú, will probably have noted two passages in Captain Burnaby's *Ride to Khiva*, on p. 163. The gallant author mentions my having accompanied the Russian Expedition that was sent to the Amú in 1874, "as far as Petro-Alexandrovsk;" and he adds, that

since then, "some Russian officers had ascended the river, seventy versts beyond that part." On p. 197, it is also stated, that since 1875, "the river Oxus has been surveyed for a considerable distance beyond the fort, *i.e.*, (Petro Alexandrovsk). These passages probably mean that in 1875, the Aral flotilla steamers reached Toyon-boyin; the point up to which the Amú-darya was actually reconnoitred in 1874, although the 'Peroffsky' steamed in that year, as far as Petro Alexandrovsk only. Readers of my paper on the Oxus, that was published in the *Journal of the R. G. S.* for 1875, will have seen that there was no particular obstacle to the ascent of steamers as far as Toyon-boyin. But, as Captain Burnaby remarks, that "it is as important to Englishmen as to Russians, to know how far the mighty stream is navigable," I here venture to reiterate the opinion I have already expressed, that "some years will elapse before a steamer *steams* up through the gap at Toyon-boyin."

It is, probably, for the purpose of overcoming the difficulty at this point, that a Russian steamer was being built in 1875 (*vide* p. 163 of *A Ride to Khiva*), "which would draw but little water and steam twenty versts per hour;" and which "would be able to ascend the stream for a much greater distance, and perhaps to the source of the river" (!) With such a boat, no doubt, the passage of the gap at Toyon-boyin could be achieved; though I confess to some unbelief as to the possibility of its construction, to say nothing of the question as to where the fuel it must consume is to come from.

Yours faithfully,

March 18th, 1877. HERBERT WOOD.

*** Major Wood is quite right to question the correctness of the altitudes on the map illustrating the Hissar Expedition. These figures were copied from the Russian map, which we reproduced. On the same map Kabadian is stated to be 450 feet above the sea, and 300 for the Amú bed cannot therefore be a misprint for 1300 feet.

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THE PECHENEGS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In reference to Mr. Vambery's derivation of Pecheneg, I would commend to the notice of Mr. Howorth, who has raised the point, another and perhaps, indeed, a less forced and more natural explanation. Frähn in his Notes to Ibn-Fozlan's accurate description of the Ancient Russ, reproduces a great many variations of the name from Arab and other writers, among which are Benageca, Benakije, Iedschnakije, *Petchenakije*, and last, though not least significant, thus, Badgia*niki*.

Now the Pechenegs, or Petchenegans, so-called, appear for the first time in history in the tenth century, *i.e.*, in the time of the Varangian Igor, during the period of his coercion of the Drevlians (Ancients, or Dwellers in Forests?)

It is to be observed that this period corresponds exactly with that of the Muhammadan or Arab and Byzantine writers on Scythia, whence it may, perhaps, be presumed that the name Pecheneg passed from the Varangians in its Sclav form to Constantinople and to Arabian travellers and merchants in a corrupted form, through the channel of commercial relations with the East, by way of the Greek Colonies in the Azof.

Hyppocrates, Herodotus, and others give us what, I think, may be accepted as very faithful descriptions of the habits and customs of the various Turk tribes of Scythia which formed, by-and-bye, the main elements of the Russ as a people—the Sclavs in Russia being but a small component part, cut off from their main stock by the freebooting and brave Varangians along the line of the Dnieper.

These habits and customs are peculiarly characteristic of modern Russia. Among the tribes alluded to we find the Pechenegs spoken of as particularly addicted to vapouring themselves in that kind of steam-bath, which seems to me, on reading through all accounts, from the earliest period to that of my own acquaintance with them, to have preserved up to this day all their original features—little, low, wooden hovels, with one apartment, containing a raised gradiating platform, and a brick stove, which, after being heated, is splashed with water for the purpose of producing steam.

The Pechenegs were thus famed by their vapour bath, and the *petch*, *petchka*, or stove, was most probably exactly what it is now all over Russia, as also among the Finlanders, a kindred and a once neighbouring tribe, among whom the *cania*, *cagnia*, or bath, is preserved in all its pristine glory.

To be brief, then, I am inclined to the belief that nicknaming the people in question after their common and notorious practice of the vapour bath, the Varangians handed them over to Constantinople, and down to posterity, as *Petchniki*, and as *Banniki*, just as they conferred the contemptuous epithet of *Mujiki*, or Mannikins, on the Russ—less manly than themselves, who would not obey their martial summons when they came to rule the country.

I would here add that in Masudi the name Jahki is applied to the same people. Was it not here that Swift found his Yahoos?

I am, Sir, yours, &c.,

March 12th, 1877. ROBERT MICHELL.

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DISCOVERY OF A PORT NEAR INAMBANE, EAST COAST OF AFRICA.

BURRA FALSA, CAPE LADY GREY.

Native name—PUMENE, S.E. AFRICA. Lat. S. 22° 56′. Long. E. 35° 41′.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Having been blown to sea, by a south-west wind, in a covered launch, from Inhambane, whilst endeavouring to reach the mail steamer for Natal, we sought refuge in this bight, and being obliged to land for food and water, the wind still continuing furiously strong and unfavourable, we sought the entrance to the river and found it. As there is no description of this port in any nautical publication, I have thought proper to address this to you for publication.

The river is nearly at the bottom of the bay, about three miles north of the Cape. It was nearly low water when we entered, with a strong southerly gale blowing; nevertheless, the rollers, though high, were not dangerous, and we soon slid through them into the calm water beyond. The entrance, unless when very close, is difficult to discover, but is marked by a very large solitary *fir* tree (of the species peculiar to this coast), which stands back against the mangroves inside. At full tide there would be twelve feet or more of water in the mouth. The river coming from the south is confined for a great distance by a low sand bank; inside it is nearly dry at low water, though there are still channels through the lagoon. Great quantities of sea fish are found therein, and good water is to be had at the head of the lagoon.

The natives being tributary to the Portuguese are, therefore, very friendly; and, for calico, will sell food, consisting of fowls, goats, manioc, fish, pea-nuts, sorghum, and maize. They have also a little rice, bannanas, and sugar cane. Two or three cocoa-nut trees can be seen from the bay outside, standing amongst the fir wood on the spit. The natives will also sell for blue bafta, a little bees wax, india-rubber, and hides.

It is said, with moderate weather or northerly winds, there is little or no surf on the shoals.

Cape Lady Grey is easily distinguished by its rocky point, upon which stands a solitary rock, like a small hut or sentry box. In southerly weather there are rollers round the Cape—it should be given a berth of half a mile and the middle of the bay sought. There are four or five fathoms of water in the bight within half a mile of the shore. The holding-ground is good, being hard sand. In case of "castaways" from wrecks seeking to land in boats, it offers every advantage. It is about three days' walk from Inhambane. There is no other opening than this between Inhambane and Bazaruta that is available as a landing place.

Yours, &c., ST. VINCENT ERSKINE.

INHAMBANE, S.E. AFRICA.

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THE RECENT VOLCANIC IRRUPTION AT THE SANDWICH ISLANDS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Many of your readers may be interested in hearing of the recent outbreak of Mauna Loa, the great volcano of Hawaii. On the night of Wednesday, the 14th inst., a brilliant eruption burst out from near the summit. A tremendous volume of smoke, ascending many hundred feet above the mountain-top, was illuminated by the red, fiery glare from beneath it, proceeding apparently from a small crater some miles distant from the great summit crater. As viewed from the deck of a vessel anchored 70 miles distant in a north-westerly direction from the mountain, five distinct columns of fire could be seen, thrown up almost instantaneously, and capped by tremendous masses of smoke. The illumination was so brilliant that all parts of Hawaii were lighted up, and even on the Island of Maui, at a distance of 180 miles, the glare was so great that the planters of West Maui thought a great conflagration was taking place on their own island.

As seen from a north-easterly direction, the several columns of fire appeared as one, thus showing that the rent from which they proceeded lay in a north-easterly and south-westerly direction. These fire-columns lasted only about six hours, but two streams of lava began to flow down the mountain towards the south, and continued to move slowly down for two days, when they united and abruptly disappeared in the earth, and all external signs of activity ceased. On the 24th, at 3 A.M., the natives living on the coast at Karakakoa Bay, 40 miles west of the mountain summit, saw, about a mile out at sea, what appeared to be innumerable lights—red, blue, and green,—and at daylight a large area of water appeared agitated, as if boiling, and giving off quantities of steam. To the passengers of an approaching steamer it appeared as if a numerous school of whales was at play—blowing and splashing. A boat sent from the steamer rowed about over the most active part, and found that quantities of lava were being ejected by this submarine volcano, which, on coming into contact with the water at a depth of from 20 to 50 fathoms, formed itself into masses of various sizes, some as big as good-sized casks, all more or less globular in form, and composed of a vast number of cells of hot lava, each filled with steam and sulphurous gases. These rise to the surface hot and hissing, and some of them containing a core of lava still in a state of fusion; after a time, its gases given off, its heat dissipated, it becomes gradually saturated with water, breaks and sinks. The lava is expelled from the bottom in such quantities that the boat was bumped by the rising blocks no less than six times in a minute, and it was estimated that an area of two or three acres was kept covered by pieces of lava whilst still capable of floating. One singular feature of this great phenomenon is that no volcanic eruption has been known in that district of Hawaii—at all events, within the reach of tradition—at least a hundred years. This lava, no doubt, comes from the summit-rent, and has travelled to the coast by subterranean passages. The submarine vents extend from point Ke-ei, about a mile out in a W.N.W. direction, about two-thirds of the distance across Karakakoa Bay, and a rent or crack has been traced some miles inshore in the opposite or E.S.E. direction. Were this outburst to form a natural breakwater on the line now occupied by floating lava, this open bay or roadstead would be converted into a magnificent sheltered harbour, such as Hawaii is greatly in need of, but does not possess. H.M.S. 'Fantome' is now on a cruise round Hawaii, and will no doubt bring us further particulars. H. W. MIST, Cap. R.N.

HONOLULU, SANDWICH ISLANDS, *Feb.* 27, 1877.

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BAROMETRICAL HEIGHTS IN THE AMAZON VALLEY.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Perhaps you will give me space for some remarks on Colonel Church's interesting article in your April number, and particularly as to barometrical determinations of height in the Amazon's Valley. As a test of these, Colonel Church takes the height of Manáos as given by different observers, who certainly differ not a little. The lowest on his list—92 feet—by Messrs. Azevedo and Pinto (of the Brazilian Frontier Commission, I believe to be a thoroughly good barometrical determination. Colonel Church seems to think even this height too great, because the tide reaches more than half way to Manáos, though the tidal rise at Parú is only 12 feet. But in this Colonel Church treats the tidal rise up a river as one of level only, neglecting the momentum; on which principle, the tide ought to rise in the Bay of Fundy no more than it rises in the Atlantic outside. I believe that up most rivers it rises higher than at the mouth; though, of course, usually, not much higher. Professor Orton's 199 feet is a fair sample of what a careful observer with a good barometer, but no corresponding observations at a base-station, with little or no local knowledge and some bad luck, may obtain. Professor Orton's bad luck was this, that he was at Alanaos in December, when the barometer is just about at its lowest; but in almost any month a traveller on the Amazons might chance to find the barometer lower (instead of higher) as he comes down the river. Thus at Manáos in 1866 (9 a.m.), I had barometer (at 32°) February 4th, 29.974; February 10th, 29.815; and a traveller at Tabatinga on February 4th, and at Manáos on February 10th, would have had a paradoxical result. Herndon's 1475 feet is worth recalling as a curiosity only. His boiling-point thermometer gave 434 feet at Nanta (about the usual amount); but at Teffé, 2052 feet; at Manáos, 1475 feet; and at Santarem, a place reached by the tide, 846 feet!! I have often tried to, but never could, divine the cause of these strange results. Once I asked Mr. Casella, but he could only suggest imperfect boiling.

Of the barometrical heights on the Madeira and Purûs, I will first criticise my own, as then I shall be more free to criticise those of others. My 107 feet at Conotama (590 miles up the Purûs) is doubtless too small a height. The observations, then, in 1864, were certainly affected by the "friagem"* or cold weather, which always brings a very high barometer, and seems to be more powerful to the west and south-west; and thereby to vitiate all barometrical heights, *even from simultaneous observations*. From my observations at Canotama in 1865, compared with monthly means at Manáos (my own and of the Frontier Commission in other years), I have found 140 feet above the sea as the value. This, I think, still too little; but the observations will give no more. Similarly I obtain at 1792 miles up the Purûs, instead of

* For a description of the "friagem," see *Naturalist on the Amazons*, vol. ii., p. 224. During a "friagem" in July 1867, simultaneous observations of mine at Teffé, and of Captain Costa Azeveda, at Manáos, with all comparisons and reductions duly made, gave the level of the river at Teffé lower than the level of the river at Manáos.

1088 feet, almost exactly 1000 feet; but 20 feet* or so should probably be added for the difference of latitude, in receding from the "equatorial depression." Other observations I have not re-calculated. When monthly means are used for comparison, the extreme error probably, I estimate at about 80 feet, and the average error to be expected (with neither good nor bad luck) about 40 feet; these, however, may be a little increased by the general meteorological conditions far up the affluents of the Amazons being somewhat different from those on the main river.

On the River Madeira, the Messrs. Keller† used two aneroids and boiling-point thermometers. Probably their observations are not sensibly less accurate on this account; for on the Amazons (I have found) aneroids agree very exactly with the barometer, and, as General Strachey says, "an exaggerated refinement in observation has no real value." I cannot see any mention as to how their observations were calculated, *i.e.*, with simultaneous observations elsewhere, or an assumed barometrical value at the sea-level &c.; and upon this point must depend very much the accuracy of their results; and, therefore, of any opinion founded on those results as to the relative level of the valleys of the Madeira and Purûs. A supposed difference of level of 100 feet might disappear, or be doubled, if the Messrs. Keller's results shall be in error as much as mine, I consider, may be, and in an opposite direction.

Lieutenant Gibbon gives the junction of the Tona and Piña-Piña as 1377 feet (Colonel Church, by mistake, quotes 1337 feet) above the *Pacific* Ocean. Probably a better absolute result, and certainly a better one for comparison with mine on the Purûs (about 135 statute miles distant), may be obtained by calculating Lieutenant Gibbon's observation with reference to Manáos, rather than to the Pacific coast, where the climate is very different. Of course there may have been some slight difference in the zeros of the barometers used, but I believe the meteorological will much outweigh the instrumental error. I find, then, the mouth of the Tono 1520 feet above the Atlantic, and about 500 feet above the highest part of the Purûs I reached.

Whatever the value of these re-calculations, they, at least, show, as Colonel Church says, "that no absolute dependence can be placed upon the accuracy of the elevations given to us by the various explorers of the Madeira, the Mayutata, and the Purûs."

As to the relative importance of these rivers as lines of communication. One can hardly doubt that the best way from the Amazons to the Bolivian settlements is by the Madeira; probably, also, it is the best way to the Madre de Dios and its upper slopes. The Purûs and Aquiry give an easy access to Bolivian territory, but it is territory uninhabited, and 250 or 300 miles away from any settlement. About 1870, an enterprising American, Mr. Piper, obtained from the Bolivian Government a concession of a large district on the north-west frontier of Bolivia; and in February 1871, a schooner, with some forty emigrants, arrived at Manáos, on its way to the Aquiry. The first town was to be called "Herndon;" indeed one emigrant told me he had paid his passage to "Herndon," as if it were an existing place; but I fear it has not yet been founded. From the impossibility of taking the schooner up the Pûrus, and lack of money to freight a steamer, the party broke up at Manáos, though Mr. Piper, with a few followers, went up to explore. So far as I have heard, he has not yet abandoned the plan.

On p. 98, Colonel Church speaks of the *south* branch of the Purûs at my farthest point as 40 yards wide: it ought to be the *north* branch. The south branch is much narrower. But the error is not very important. (*Royal Geographical Society's Journ.*, vol. xxxvi, pp. 109, 113.)

I am, Sir, your obedient Servant,

W. CHANDLESS.

* Sir J. Herschel's *Meteorology*, § 163.

† *Vorn Amazonas und Madeira*, p. 144.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of March 12th, 1877.

On taking the chair, the President, SIR RUTHERFORD ALCOCK, informed the meeting that two papers were to be read: the first, by Mr. Buchanan, who had served as chemist on the scientific staff of the '*Challenger*' expedition, related to the distribution of salinity in the ocean, or its saltness at different depths and in different latitudes; and dealt with several interesting problems in Physical Geography, as to the dissolving power of the water, its specific gravity, its effects upon the deposits. The second paper was by Mr. Allen, of Her Majesty's Consular Service, on an interesting journey he had made into the interior of Formosa, a part of that island occupied by aborigines and savage tribes.

Mr. J. Buchanan then gave his paper

ON THE DISTRIBUTION OF SALT IN THE OCEAN AS INDICATED BY THE SPECIFIC GRAVITY OF ITS WATERS.

During the cruise of the '*Challenger*' the specific gravity of the water from the surface and from the bottom and intermediate depths was determined by a glass, combining the advantages of Nicholson's hydrometer with those of the one with divided scales, and the results obtained with it were accurate to 5 in the fifth decimal place. The observations were always made when the water was sensibly at the temperature of the atmosphere, the results so obtained were reduced by means of the tables of the late Professor Hubbard, of Washington, to their value at the standard temperature of 15°56· C. (60° F.), the density of distilled water at its temperature of maximum density being unity. In this way the specific gravity of nearly 2000 different waters was determined, and found to vary between 1024 and 1028, between which limits it may be assumed with certainty that the salinity varies with the specific gravity.

The distribution at the surface of saltness thus indicated was exhibited on a chart by means of differently coloured areas, and the vertical distribution was shown in the diagrams representing meridional sections of the Atlantic and Pacific Oceans respectively.

As far as the surface is concerned, the concentration of the waters of the Atlantic was found to be greater than that of either the Pacific or the Southern Oceans, and it is greater in the North Atlantic than in the South Atlantic, although the actual maximum may be slightly higher in the South Atlantic. In the North Atlantic the maximum was observed in 22° N. lat. and 40° W. long., from which point it diminishes in all directions. The maximum in the South Atlantic was 102,785 off the coast of Brazil, in 17° S. lat. In the Pacific the areas of concentration are much less pronounced, the maximum of 10,272 occurring near the island of Tahiti. In the North Pacific the maximum is under 10,265, and situated about 22° N. Between the north and south maxima in these oceans is situated the area of equatorial dilution. Following the equator from east to west in the Atlantic, the water increases markedly in saltness, as it does also in the Pacific, though in a less degree. On the polar sides of the areas of concentration the saltness diminishes as the latitude increases, at first rapidly, then more slowly. The whole of the Southern Ocean between the parallel of 40° S. and the edge of the ice appears to have a very uniform surface specific gravity of about 10,250. In the North Pacific, to judge from Leng's observations, it is lower, and in the North Atlantic higher.

If we consider the water below the surface, as shown

in the vertical sections, we find, in the Atlantic, that in the concentration areas the specific gravity diminishes until a minimum is reached at a depth of about 800 or 1000 fathoms, after which it increases slightly down to the bottom, where, in the South Atlantic and in the Pacific, a tolerably uniform specific gravity of 10,257 to 10,259 is observed. In the areas of equatorial dilution the specific gravity first increases to a maximum at a depth of 50 to 100 fathoms, after which it follows the same law as the water north and south of it. In the North Atlantic the bottom specific gravity is comparatively high. In investigating the causes of the variations in specific gravity in the ocean, we find that they depend on the means available for removing or supplying water. Thus the areas of greatest concentration coincide with those where the dry trade-winds are constantly blowing, taking their rise in the lower temperate latitudes, and proceeding in their course always from colder to warmer regions, so that, for the first part of their journey, at least, although they are continually taking up moisture, their capacity for doing so is continually increasing. Hence the great concentration of the water in the steady trades of the Atlantic. On the other hand, the westerly winds of the higher temperate latitudes which take their rise at the same source, proceeding in the first part of their course from warmer to colder latitudes, are soon comparatively saturated, and incapable of concentrating the waters over which they blow. The moisture taken up by the trades is wrung out in the equatorial calms, where it descends as heavy rains, and dilutes the sea water. Comparing the salinity of the sea surface with the distribution of barometric pressure, we find that the maximum of saltness lies in the northern hemisphere to the south-west, and in the southern hemisphere to north-west of the barometric maxima. Concentration is also brought about by the formation of ice, and in regions where more ice is formed in winter than melts in summer, which in the southern hemisphere would enclose a very large area, the effects must be cumulative. In the Southern Ocean the specific gravity of the bottom water was always much higher than that of the surface.

The high-bottom specific gravity in the North Atlantic depends not only on the lake-like form of the basin in which the water is kept by tangential winds and currents from getting out of the concentrating effects of the trade-winds, which effect is propagated downwards to a great extent by the difference between the summer and winter temperatures, but also on the fact that all the accumulations of salt brine from the Mediterranean are emptied into it through the Straits of Gibraltar. It is probable that a similar effect is produced on the Indian Ocean by the proximity of the Red Sea.

The observations make it probable that in the Atlantic the water from the surface, down to a depth of 1000 fathoms, has on the whole a flow *inwards*, or from south to north, and below that depth and down to the bottom it appears to have an opposite flow, thus providing for the removal of the salt which otherwise would accumulate in the North Atlantic. The Atlantic thus presents on a larger scale what is observed in the Mediterranean, where the mean drying power of the atmosphere is higher than even the North Atlantic. In the Pacific, owing to its form and general climate, these conditions are not so evident.

After a few remarks from the President, Mr. ALLEN proceeded to read his paper

ON A JOURNEY THROUGH FORMOSA FROM TAMSUI TO TAIWANFU.

At the invitation of Mr. Mackay, of the Canadian Presbyterian Mission in the north, and Mr. Ritchie of the English Presbyterians in South Formosa, to accompany them on a tour to their respective stations, Mr. Allen started in November, 1875, from the old Dutch fort at Tamsui. Crossing the harbour near its entrance, and skirting the western side of the Kuanyui Hill, 1720 feet above the sea, they gained the table-land which stretches some 30 miles down from the coast. The plain was covered with paddy and sugar-cane crops, and heavy four-wheeled carts, generally drawn by a buffalo, with two of the ordinary black cattle on each side were constantly met with. About 8 miles from Tekcham, which is the capital of Tamsui, they reached Table Hill, or Windmill Slope, the termination of the plateau, and got a good view of the sea to the westward, and, descending, crossed the river in a flat-bottomed boat. Passing through the large towns of Heongsan and Tiongkong, and leaving the large town of Oulan on their right, they came to Suikang, which is the last of Mr. Mackay's stations, where they were warmly received by the catachist of the chapel. Most of the converts in Suikang are Pepohuans, are found generally established in small colonies between their Chinese conquerors and their brothers, the wild aborigines of the interior, and are a simple minded and quiet people. Leaving Suikang, and making a midday halt at Tunglowan, they travelled up a long and very pretty valley, then over a small range of hills, and next came to the colony of Laisia, the population of which is entirely Christian and numbers about 200. Passing through the village of Siutiam, and travelling along the base of the hills, over a plain some miles wide, strewed with rocks and boulders, Mr. Allen and his companions arrived at Toasia. Proceeding S.S.E. for 13 miles over a fertile plain, cultivated with sugarcane, tobacco, ground nut, sweet potatoes, &c., they gradually approached the range of hills which lay to their left. At the head of the gorge due east of the district town of Changhua, they were met by a party of about forty Pepohuans who were to act as their body-guard through the mountains. The gorge wound a good deal, with a thick jungle on both sides, which the Pepohuans occasionally set on fire. As they proceeded the pass became narrower, until they reached a point where a big camphor tree almost blocked it up, the width being only five feet. Mr. Allen described the scenery as magnificent, the mountains rising 2000 or 3000 feet, almost perpendicularly on each side, were covered with camphor and other forest trees. One or two veins of coal were noticed on the rocks, and a stratum of conglomerate pebbles in the clay, 600 feet above their heads. At the end of the gorge the ranges of hills opened out, and although they occasionally had to cut their way through the jungle, travelling was much easier. A small edible, acid fruit, resembling a raspberry was found here, as well as a sweet smelling fern, which the natives called Tanpa; but no savages were met with. The fertile, and well-watered plain of Posia, with a population of 5000, was next reached, and here they remained five days. Mr. Allen was shown an electro-plated silver cup, about two inches long, which an old man assured him had been an heirloom in his family for 200 years; but from some marks on it, he believed it to be an old Dutch matchbox.

Resuming their journey through another pass to the south they came to the beautiful lake of Tsui-sia-hia, or lake of the Water Savages, a distinct tribe who live on its banks. They are a degraded race, and are employed as slaves by the Chinese; they tattoo their faces in bands across the nose, are tall, and would be well-proportioned but for a pernicious habit they indulge in of tying cloths tightly round their waists, which deforms them very much. Travelling in a south-westerly direction over the hills, their next halting-place was Chipchip, which is entirely Chinese, and is the head-quarters of a mandarin. A number of villages were passed, one of which, Limkepo, is said to have a population of 3000. The valley through which they travelled wound about a good deal, and it was dusk before Toulak, their next resting-place was reached. The main road was struck at Tapona, and passing a few villages, the largest of which was Tamao, they arrived at the Mission Chapel at Kajee, and being within two days' journey of Taiwanfu, Mr. Allen bade adieu to his

companions, and on the nineteenth day, after a journey of 220 miles, reached Taiwanfu.

A short discussion followed the reading of this paper.

Meeting of March 26th, 1877.

SIR RUTHERFORD ALCOCK, President, in the Chair.

The paper of the evening was by Sir GEORGE S. NARES

ON THE NAVIGATION OF SMITH SOUND AS A ROUTE TOWARDS THE POLE.

This interesting paper appears as an article in our present number, see p. 119, to which we beg to refer our readers.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

THE monthly meeting of the 2nd (14th) March took place under the presidency of M. P. de Semenof. The Secretary announced the commencement of three new works under the auspices of the Society. The first of these is an ethnographical description of the regions of the Upper Oxus, the Hindu Kush, and the Himalaya. M. Veniukof proposes to summarize, in the Russian language, the ethnological information afforded in the works of Burnes, Wood, Shaw, Hayward, and others respecting these regions, as well as that derived from Russian sources such as Abramof, Grebenkin, Kuhn, Fed chenko, Scobolef, and from the works of Klaproth. Abel de Remusat, Stanislaus Julien, Palladius, &c. M. Veniukof proposed to illustrate the work by an ethnographical map and a vocabulary.

The committee charged with the duty of examining this proposal reported very favourably on it, and recommended the preparation of a succinct account of the geography and ethnography of the lands about the sources of the Oxus, the Yarkand Daria, the Indus, and the Cabul Daria, as well as of a complete reference to all works bearing on the subject.

M. Veniukof's scheme met with like approval from the Council, but it has unfortunately been found imperative to defer its execution for financial reasons. M. Minaief has, however, undertaken the duty of accumulating materials.

Another scheme which met with favour, but which was not submitted in a detailed form, was proposed by M. Maïnof, and dealt with an ethnological study of the Finars, inhabiting the banks of the Volga, among whom he had made investigations, traversing, in the course of his work, parts of the Governments of Tver, Nijni-Novgorod, Tambof, Penza, Simbirsk, and Saratof. This scheme, on examination, was somewhat reduced in scope, so as to deal exclusively with the Mordvas and their ethnology.

The third scheme suggested to the Society, referred to a survey of the rapids of the Angara River, which when discovered by the Cossack Ivanof, in 1643, had long been a great commercial highway, and has preserved that character up to recent times. At present there is scarcely any navigation except between Irkutsk and Bratsky-Ostrog. This project, which is proposed by M. Sibiriakof is now under consideration.

Lieutenant Opotsevitch of the Imperial ship 'Vsadnik' gave an account of his hydrographical labours in the Sea of Okhotsk, Behring Sea, and the Arctic Ocean to the north, and M. Paschine related his travels in Burmah.

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PARIS GEOGRAPHICAL SOCIETY.

March 7th, 1877.—M. E. LEVASSEUR in the chair. The President announced the death of the Marquis de Compiègne, recalling the great services which he had rendered to geography.

M. H. TARRY, in a letter written from Rome, draws attention to the recommendation of synchronous meteorological observations to be made throughout the world at 12.53 p.m., Paris time, and desires that instructions to that effect should be given to the travellers supported by the Society.

M. SIMONNIN supplied some information on the Geographical Society recently established at Marseilles. It publishes a monthly *Bulletin*, causes geographical lectures to be delivered, and proposes to found an Industrial Museum.

Dr. HARMAND, of the French Navy, read a paper on the Mois, a tribe inhabiting the district bounded by the Don Nai, and its tributary, the Song-be, in Cochin China. They are a mixed race, and can hardly be called savages. They have no religion, but believe in evil spirits, and every act of importance is preceded by a propitiatory sacrifice. No animal is killed without a bundle of bamboos being suspended to the roof of the house. Their houses are built on piles, about two yards in height. Their arms consist of cross-bows and cutlasses. The chiefs carry a weapon consisting of a long broad blade of iron and an iron attached to opposite sides of a wooden handle, which is used indifferently as a sword or a javelin, and with which they attack the elephants. Their forests are almost inaccessible during the rainy seasons, and blood-thirsty leeches abound in them.

M. Ch. COTARD furnished a few particulars on the late M. Oliver Bixio, who died at Darien on the 8th January, 1877.

M. BONNAT rendered an acount of his explorations in Ashanti and on the River Volta. He spoke highly of the Ashantis, whom he looked upon as the most civilised of all negro tribes. He proposed to return to Western Africa on the 17th March.

The PRESIDENT announced that the Grand Medal of the Society had been awarded to Commander Cameron, a Gold Medal to Captain Roudaire, a Silver Medal to MM. Folin and Périer for their work, *Le Fond des mers*, and the Gold Medal founded by M. La Roquette to M. Gabriel Gravier, for his work on ancient voyages to the Arctic Regions.

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BERLIN GEOGRAPHICAL SOCIETY.

January 6th, 1877.—Dr. BASTIAN in the chair. The President announced the death of Dr. K. E. von Baer, one of the honorary members of the Society, and of Dr. R. Avé-Lallemant, of Lübeck, the author of several important works on Brazil. Dr. Reiss, just back from his geological exploration of South America, was present. Amongst the works presented are a plan of Old Jerusalem, published by the German Society for the Exploration of Palestine, recently founded at Basel; a work on Bosnia, by Herr Blau, with a map by Dr. Kiepert; and the first volume of Baron Richthofen's work on China.

Dr. OSCAR LOEW read a paper on Lieut. Wheeler's expedition to the south-western portion of the United States, to which he had been attached as geologist.

Dr. P. ASCHERSON read a paper on the Little Oasis, which he visited in spring last.

February 3rd, 1877.—Baron RICHTHOFEN in the chair. Dr. LENZ reported on his three years' exploration in the Ogowé country.

Dr. POGGE delivered an address on his journey to Musumba, the capital of the Muata-Yamvo. He described the climate as healthy, and thought that the route followed by him would prove advantageous to future explorers. From information collected by him it would appear that the Kassai is the main branch of the Congo, and that the Lualaba has no connection with that river, but flows north in the direction of the Ogowé. The Congo in Loando, was known as Nzare.

March 3rd, 1877.—Dr. BASTIAN in the chair. The Chairman announced that Geographical Societies had been established in Denmark and Belgium, and that the Bremen Polar Society had transformed itself into a Geographical Society. No trustworthy information had been received hitherto about the death of Herr E. Mohr, who was in perfect health when Dr. Pogge parted from him at Pungo Andongo. The reported murder of the traveller did not appear to him deserving of credit. Mohr's death had seriously interfered with their plans of exploration, but the cause in which he died would not be relinquished. Even now Dr. G. Nachtigal was seriously considering whether to step into the breach.

Letters were read from Dr. E. VON BARY, who was now exploring the geology of the Sahara.

Baron THIELEMAN, the Secretary of the German Embassy at Washington, delivered an address on the North American Indians. He said that our European notions with respect to them, based as they were upon novels and the statements of partizans, were altogether erroneous.

Dr. COCHINS then read the second part of his paper on Japan.

March 7th, 1877.—Dr. BASTIAN in the chair.—The Emperor of Brazil was present. The President, in alluding to the Geographical Society recently founded at Rio de Janeiro, said that the thorough exploration of South America offered an ample field for its activity. He announced the death of two of the members, Drs. Braun and Osrehmiker, and of the Marquis de Compiègne, who had fallen in a duel at Cairo. He also invited subscriptions towards a monument of the mathematician Gauss to be erected at Brunswick.

Captain Baron SCHLEINITZ then read a paper on the natives of M'Cluer Gulf in New Guinea and of Melanesia, which he visited during the voyage of the 'Gazelle.' He could not confirm the view, that, with the exception of certain coast districts, where a mixture with Malays had taken place, the population consisted of true Papuans. On the contrary, the true Papuans of the interior of New Guinea, differed very much from the inhabitants of Northern Melanesia. The complexion of the natives of New Hanover and New Ireland was a rusty brown, and sometimes hardly darker than that of Southern Europeans. They were altogether a superior race, as regarded build, and only in the southern portions of New Ireland and New Britannia did they resemble the Papuans met with in North-Western New Guinea. They were split up into innumerable tribes, all of them talking different languages, and holding scarcely any communications with each other. In their frail canoes they dare not venture upon the open sea. The men wear no clothing whatever, while the women content themselves with a string round the waist or a small apron made of bass. The women cut their hair short, and protected themselves against the rays of the sun by wearing pandanus leaves. They wear ornaments of pearls, shells, the teeth of animals, and tortoise-shell. The chiefs stick feathers into their hair, and sometimes wear collars ornamented with rows of teeth, &c. Much attention is paid to the dressing of the hair. Sometimes one-half of the head is dyed red, the other white, and the top yellow. Immense wigs were also worn, particularly in New Britannia, and teeth, thorns, and other articles are stuck through the wings of the nose.

The natives on M'Cluer Gulf were in part mixed with Malays. They were dolichocephalous and their average height was 1·595 metre. Their shyness, and the hostile attitude which they assumed upon the approach of Europeans, were explained by the slave-hunts formerly carried on by the Sultan of Tidore.

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VIENNA GEOGRAPHICAL SOCIETY.

February 27th, 1877.—BARON HELFERT in the chair. Dr. R. von DRASCHE-WURTINBERG read a paper on his travels in the Philippines and Japan, which was illustrated by the ethnographical collection presented by him to the Imperial Museum.

Herr. Franz RZIHA gave a description of a mountain-slip at Steinbrück, illustrated by maps and photographs.

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HAMBURG GEOGRAPHICAL SOCIETY.

March 1st, 1877.—HERR L. FRIEDERICHSEN in the chair. The Chairman, in announcing the death of the African explorers, E. Mohr and Baron Barth, expressed the opinion that the former had succumbed to disease, and that his reported murder would turn out to be a fiction.

Professor K. WIEBEL read a paper on submarine earthquakes and their causes.

The Chairman exhibited a new topographical map of Hamburg and its environs.

The election of the Council then took place. Dr. Kirchenpauer remains President, and amongst the other members are Professor Neumayer, L. Friederichsen, C. Godefroy, jun., Dr. L. Harms, and Dr. G. Rümker.

April 5th, 1877.—Dr. KIRCHENPAUER in the chair. Dr. NEUMAYER, in presenting the first meteorological report of the German Naval Observatory, remarked these reports would be issued in future every month. He then read a paper on recent explorations in Australia.

Herr FRIEDERICHSEN presented the society with a summary of Stanley's letters, recently published in the *Daily Telegraph*.

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PORTUGUESE GEOGAPHICAL SOCIETY.

March 27th, 1877.—The Portuguese Government having declined to appoint a Commission to co-operate with the International Association for the Exploration of Africa, the Society appointed fifteen of its members to act as such, under the presidency of the Viscomt de San Januario.

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THE SPANISH GEOGRAPHICAL SOCIETY.

THE Geographical Society of Madrid issues a monthly *Bolctin*. We noticed the first, which appeared in July 1876, in our number for February, p. 43, and we have now received the issues for August, September and October. The August number opens with a memoir by the acting President, Don Francisco Coello, on the present state of geographical work throughout the world, commencing with an account of the Spanish surveys, and of their progress. A topographical survey was commenced in 1857, and the greater part of the cadastral survey of the province of Madrid has been completed, together with a system of levelling. The work was disorganized in 1866, owing to financial difficulties, and little progress has since been made. At the same time, a system of secondary triangulation has been completed in the Provinces of Madrid, Cadiz, Cordova, and Seville; is well advanced in those of Albacete, Jaen, and Malaga; and has been commenced in Toledo and Guadalajara. The Geographical and Statistical Institute, under the direction of Don Carlos Ibañez, has commenced the publication of a map of Spain, based on the Topographical Surveys, on a scale of $\frac{1}{50000}$. Three sheets have already been engraved, which Señor Coello believes will be found equal, both as regards accuracy and

execution, to the best publications of the kind in Europe. Señor Coello then refers to the hydrographic labours of the Spanish navy. The coasts of Spain were originally surveyed by Tofino, in the end of the last century. The charts have since been revised, and portions of the coast have been re-surveyed. Captain Don José Montojo has completed a survey from the Guadiana to the Portuguese frontier, in connection with the shore triangulation, and the results have been published in five sheets. Charts of the Guadiana, of the Guadalquiver, as far as Seville, and plans of Algeciras and Malaga have also appeared recently. The map of the Island of Cuba is in course of publication at Habana, by Don Estevan Pichardo, in thirty-two sheets, on a scale of $\frac{1}{100000}$, and fourteen sheets have already appeared. In the Philippine Islands, the hydrographic work has been under the superintendence of Don Claudio Montero, and the survey is completed with the exception of part of the east coasts of Luzon, Somár, and Mindanao. The most recent work has been the survey of Joló and the Tani-tani group. Use has been made of foreign surveys, especially of those by Captain Bate, of Palawan Island, in compiling the Spanish charts. The recent Spanish publications have been a general chart of the Philippines, in two sheets, sixteen sheets on a larger scale of coasts and islands, and many plans of ports and anchorages. The Hydrographic Department publishes an annual Report, which is now in the fourteenth year of its existence, and is preparing a general index of all the manuscripts preserved in its archives, which will be a work of great value and importance.

In 1849 the first Commission was nominated for the publication of a geological map of Spain, and soon afterwards the maps of the Provinces of Madrid, Segovia, Palencia, and Valladolid appeared under the able superintendence of Don Casiano de Prado, the first among Spanish geologists. In 1854, appeared those of Alicante, Valencia, and Castellon, by Don Frederico Botella, and in 1858, the geological description of the Province of Oviedo appeared, being the work of Don Guillermo Schulz. In 1864 Casiano de Prado published his geological account of the Province of Madrid, and a geological map of the mountains of Palencia. In 1874 followed the geological memoir of the Province of Zaragoza, by Donayre. In 1870 a new geological commission was formed, and in 1873 Don Manuel Fernandez de Castro was placed at its head, since which time there has been considerable progress. The *Geological Boletin* contains bibliographical notes on the origin and progress of geological studies in Spain, and memoirs on the Provinces of Almeria and Cuenca by the engineer Cortazor. Finally, Federico de Botella has compiled a general geological map of Spain and Portugal, on a scale of $\frac{1}{1000000}$, which will soon be published.

There is also a Commission for the preparation of a forest map of the Peninsula, under the superintendence of Don Francisco Garcia Martino, the Inspector-General of Forests. The object of this work is to determine the area and position of forests, to establish the proper extent of forest lands with reference to the necessities of each region, and to separate the cultivable from the forest lands. For this purpose the orographic system of the peninsula has been studied, and the fuel and timber producing trees have been noted with regard to the climate each requires, and to their areas. Some progress has already been made in the collection of forest statistics.

Under the "Junta Estadistica," there is also a hydrological survey, which has already published memoirs on the basins of the Guadalquivir and Ebro Rivers, accompanied by maps. The War Office ("Deposito de la Guerra") has completed itineraries of the principal roads, accompanied by descriptive memoirs and various other maps; and Señor Coello concludes his review of the geographical progress of Spain by noticing the marked improvement in the educational publications of late years. He then passes in review the geographical work that has been achieved by other countries during the year. Among the travellers and explorers in Persia there is one Spaniard, Don Adolfo Rivadeneyra, who has extended his journeys through the Provinces of Laristan and Kerman, and whose map and narrative will appear in a future number of the *Boletin*.

In addition to the important address by Señor Coello, the second number of the *Boletin* contains a notice of Don Fermin Caballero, the first President of the Society, whose lamented death took place almost immediately after his election. He was chosen President on the 24th of March, and died on the 17th of June, 1876. Señor Caballero was born at Barajas de Mello, near Cuenca, in 1800, and after studying law at the University of Madrid, devoted himself especially to botany, agriculture, and geography. In 1822 he became Professor of Geography in Madrid. He published manuals of the English language, of geography, and of botany, lives of celebrated natives of Cuenca, a little work on agriculture, for the use of the people of Barajas, his native village, and many other works. On the formation of the Spanish Society, this distinguished man of letters, and ardent geographer, was unanimously chosen as its first President. He has been succeeded, as acting president, by the learned Don Francisco Coello.

The third number of the *Boletin*, for September 1876, contains an account of a visit to the Troad, in 1871, by Don Juan de Dios de la Rada y Delgado; a paper on the hieroglyphics engraved on volcanic rocks in the Canary Islands, by M. Sabin Berthelot, and two strictly scientific articles.

In the October number we have a valuable series of papers on the Philippine Islands, by Don Claudio Montero, one of the Vice-Presidents of the Society. These papers are of the nature of a monograph. The first commences with a review of maps and charts of the islands, in which our own surveyors, Captains Bate and Chimmo, receive their fair share of notice. Señor Montero then proceeds to give a succinct but very interesting history of the Spanish expeditions, which discovered and settled the Philippine Islands; of Magellan, Loaisa, and Saavedra, of Villalobos, and of Legazpi, the founder of Manila, who formed the first permanent colony. In the second paper there is an account of the Muhammadan Malays of Mindanao and Joló, and an account of these islands. This number of the *Boletin* also contains translations of the review of Bancroft's *Races of the Pacific States*, and of an article on Fergana, from the *Geographical Magazine*.

NOTICE.

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Manuscripts sent to the Editor cannot be returned, nor can the Editor be responsible for them.

Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

The right of translation is reserved.

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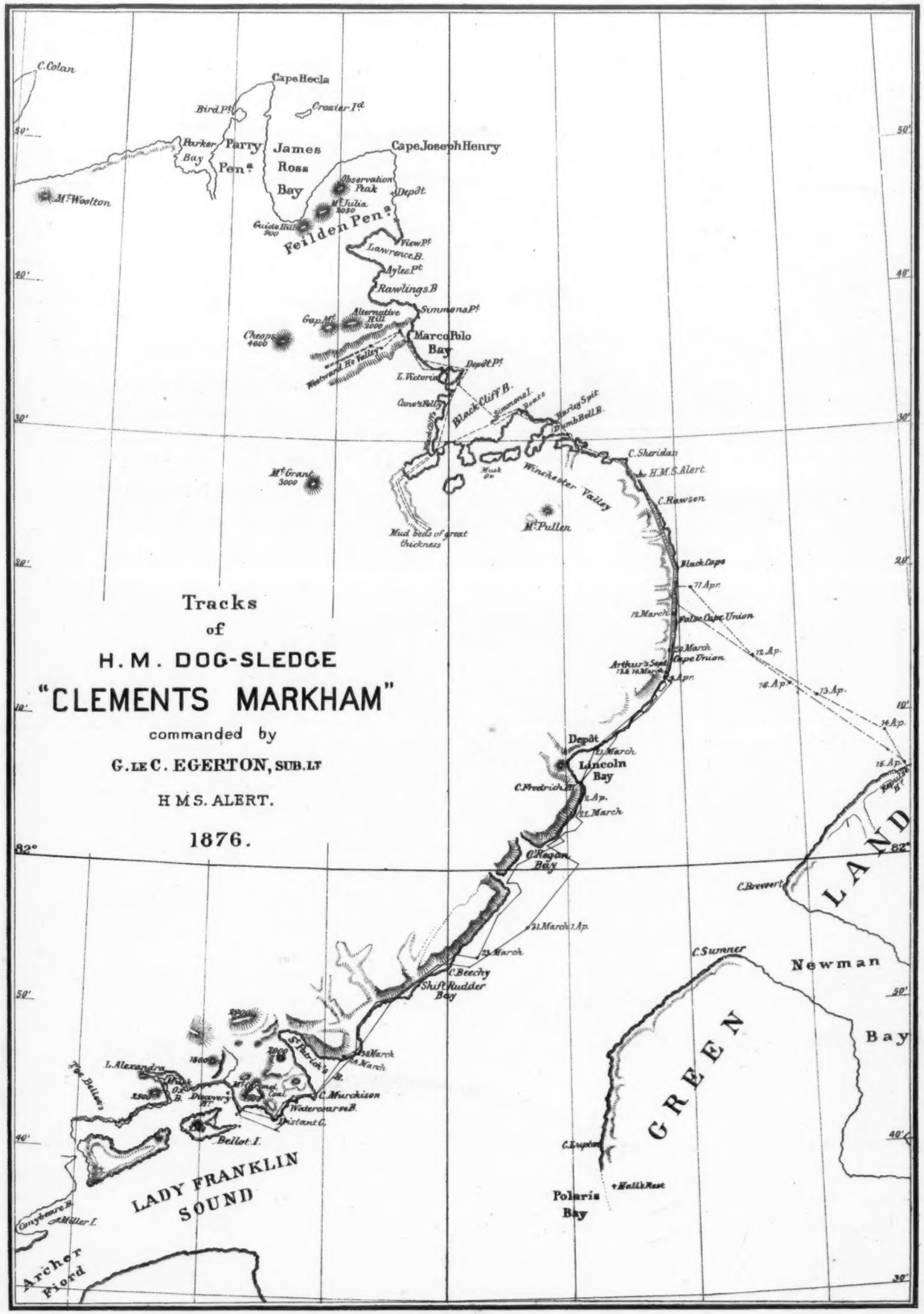
Tracks
of
H. M. DOG-SLEDGE
"CLEMENTS MARKHAM"
commanded by
G. LE C. EGERTON, SUB. LT
H M S. ALERT.
1876.
C. Colan
Cape Hecla
Bird Pt.
Crozier Pt.
Parker Bay
Parry Pen.a
James Ross Bay
Cape Joseph Henry
Observation Peak
Depôt
Mt. Julia 1050
Mt. Woolton
Guide Hill 900
Feilden Pen.a
View Pt.
Lawrence B.
Aylec Pt.
Rawlings B.
Simmons Pt.
Gap Mt.
Alternative Hill 2000
Cheops 4000
Marco Polo Bay
Depôt Pt.
L. Victoria
Cane's Valley
Black Cliff B.
Simmons I.
Bees
Parry Spit
Dumb Bell B.
C. Sheridan
H.M.S. Alert
Musk Ox
Winchester Valley
C. Rawson
Mt. Grant 3000
Mt. Pullen
Mud beds of great thickness
Black Cape
11 Apr.
12 March
False Cape Union
19 March
12 Ap.
Arthur's Sound
13 & 14 March
Cape Union
14 Apr.
16 Ap.
13 Ap.
14 Ap.
Depôt
17 March
Lincoln Bay
C. Frederick
2 Ap.
22 March
C. Regan
Bay
C. Brevoort
LAND
21 March 7 Ap.
29 March
C. Sumner
Newman
Bay
C. Beechy
Shift Rudder Bay
GREEN
St. Patrick's B.
28 March
3 March
L. Alexandra
The Bellows
C. Murchison
Watercourse B.
Distant C.
Bellot I.
LADY FRANKLIN SOUND
C. Lupton
Polaris Bay
Hall's Rest
Conybeare B.
Miller I.
Archer Fiord
80°
82°
50'
40'
30'
20'
10'